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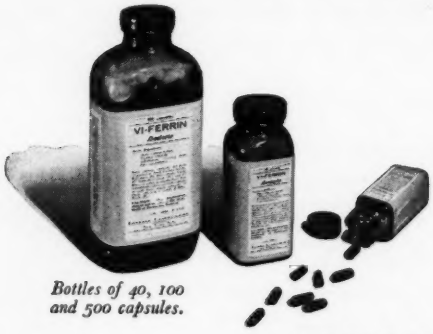

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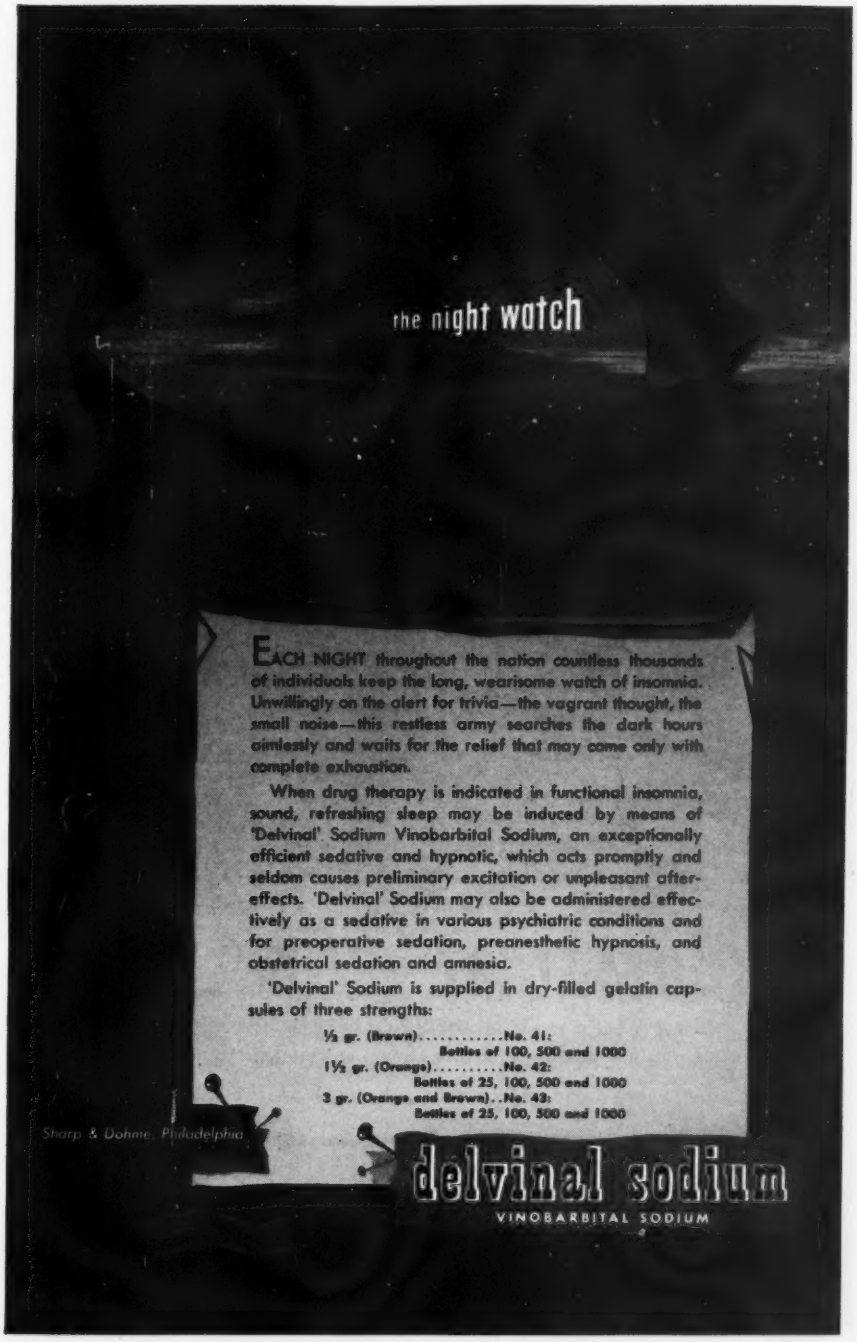
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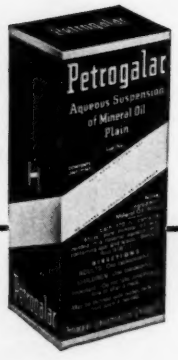

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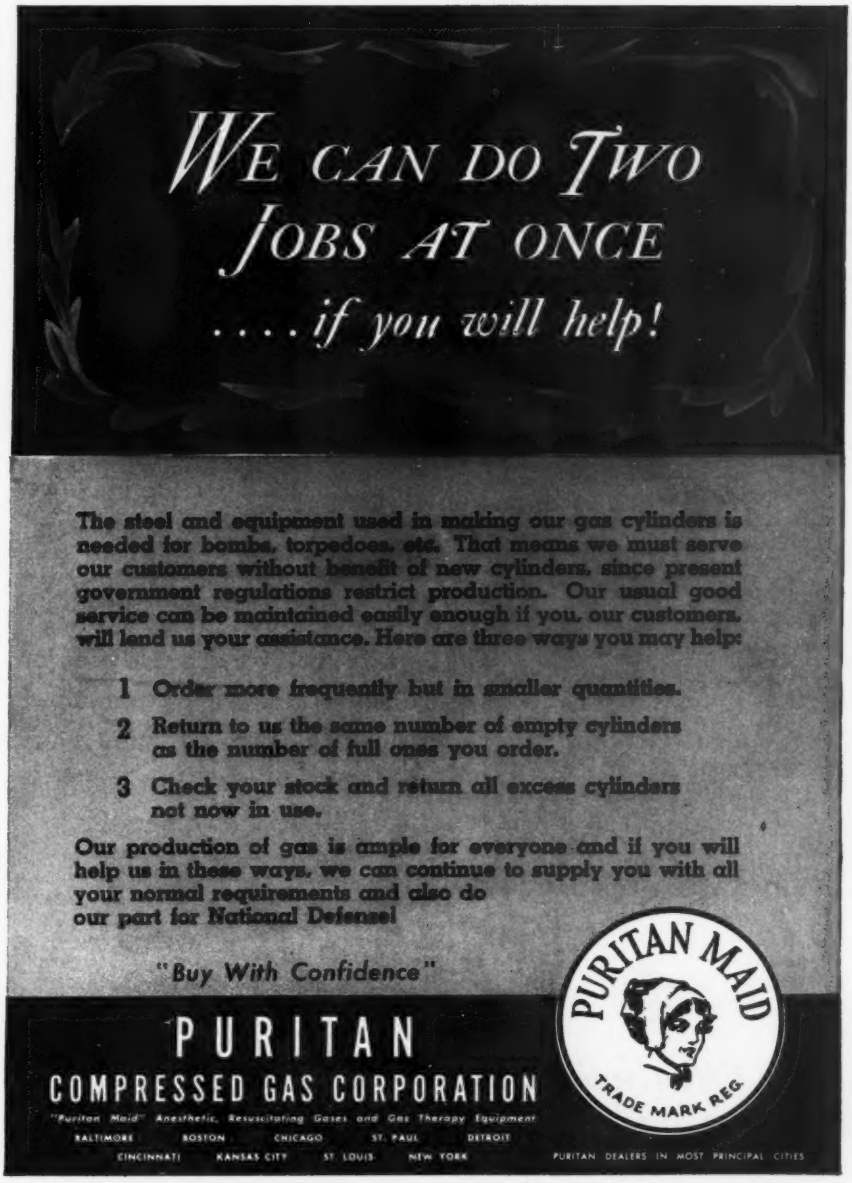
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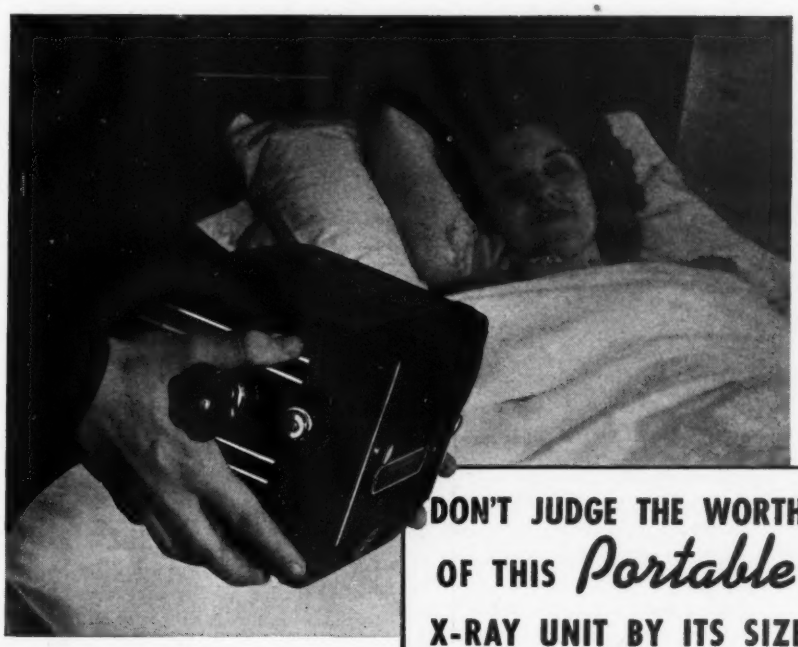

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"The importance of hypertension as a problem of health needs emphasis. High blood pressure is both a common disease and a serious one. Indeed, it appears to be more common and more deadly than cancer." — Allen, E. V., Medical aspects of arterial hypertension. *Bull. N. Y. Acad. Med.*, 17. March 1941.

TREATMENT of arterial hypertension today is necessarily directed in most cases toward relief and not cure. When a cure cannot be effected, or control by rest and dietary measures is impossible, the employment of medical treatment is suggested. Among the various preparations available, Erythrol Tetranitrate offers the advantage of producing a reduction in blood pressure sufficiently prolonged so that administration three times daily may maintain the reduction. It may be prescribed over a prolonged period with sustained effect.

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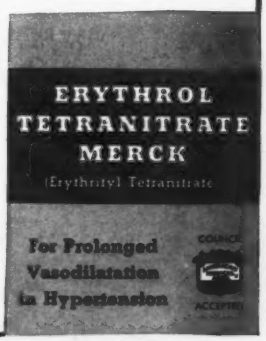

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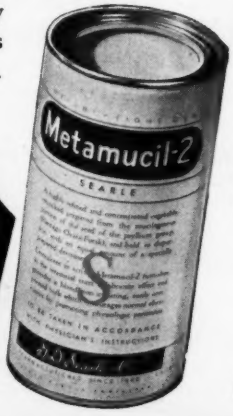

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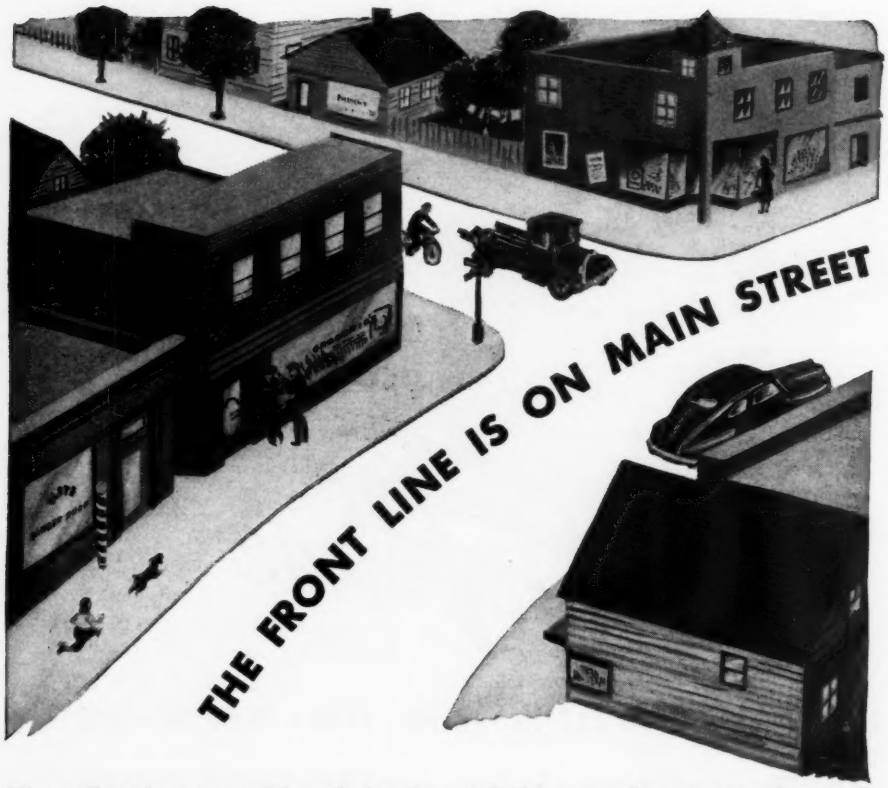

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(1) C. T. Javert and C. Macri, Prothrombin Concentration and Mineral Oil, Am. J. Obst. & Gyn. 42:409 (Sept.) 1941.

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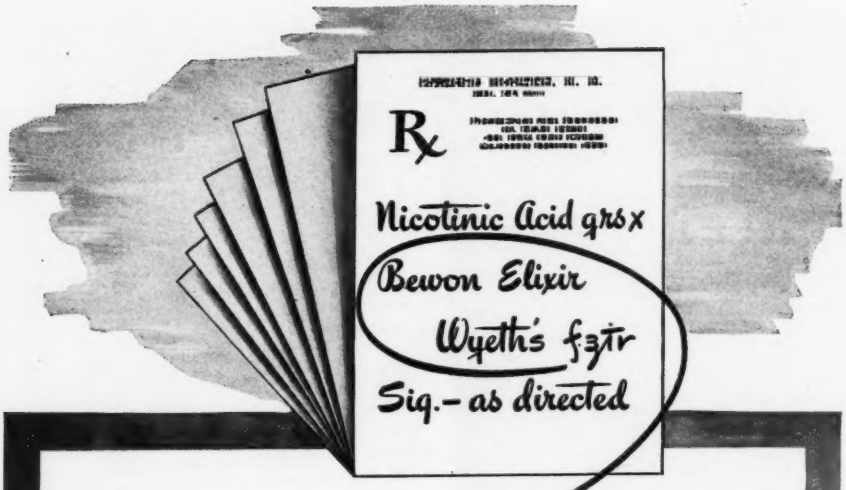

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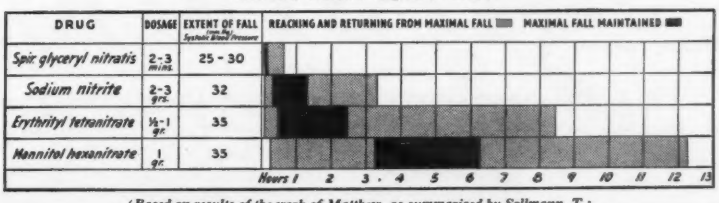


(Based on results of the work of Matthew, as summarized by Sollmann, T.: Manual of Pharmacology, Philadelphia, W. B. Saunders Co., 1936, page 483.)

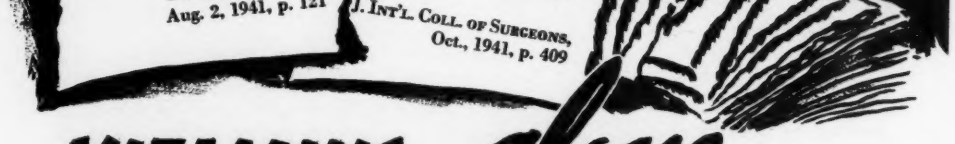
Growing Medical Opinion Substantiates . . .

"... Minor degrees of deficiency in *vitamins and minerals* are, however, common. The clinical manifestations of such sub-clinical states are somewhat vague, the patient usually complaining of general ill health, loss of appetite and energy, and sometimes increased tendency to infections."

THE LANCET
Aug. 2, 1941, p. 121

"The tendency is to discover more and more deficiencies in diet. From observations of the work done in various universities along specialized lines, it appears that a clinical case never suffers from a single *vitamin or mineral* deficiency, but rather from a multiple one."

J. INT'L. COLL. OF SURGEONS,
Oct., 1941, p. 409



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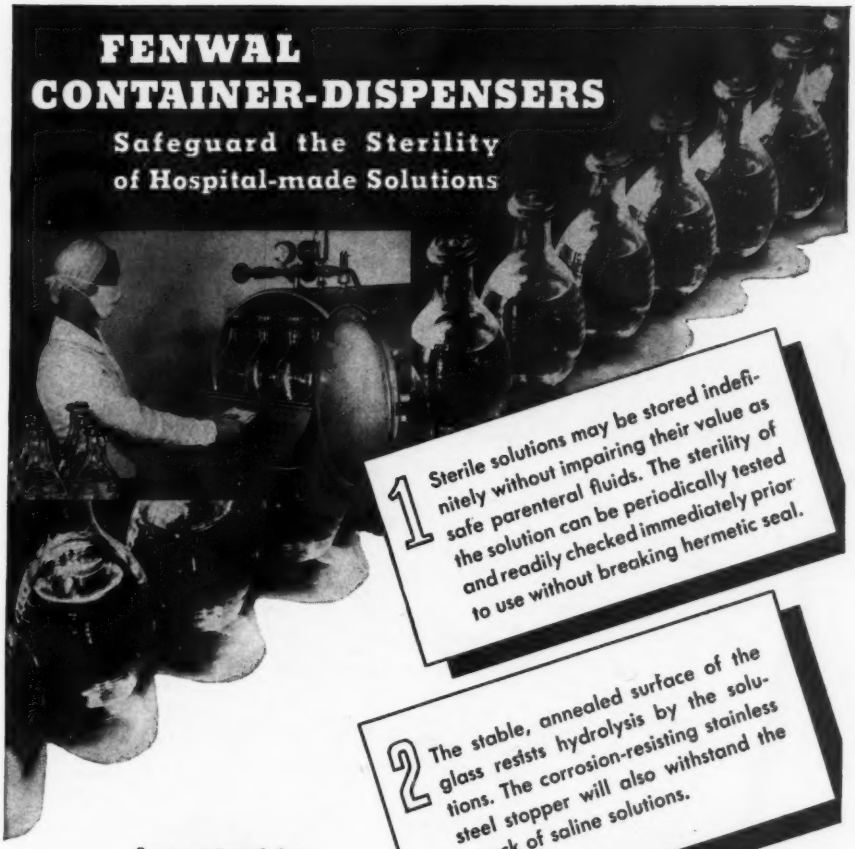

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*Kirwin, T. J., Bridges, J. P., Am. J. Surg. LII, 3:477-480, June, 1941. (From the Urological Department, New York City Hospital, Welfare Island, N.Y.)

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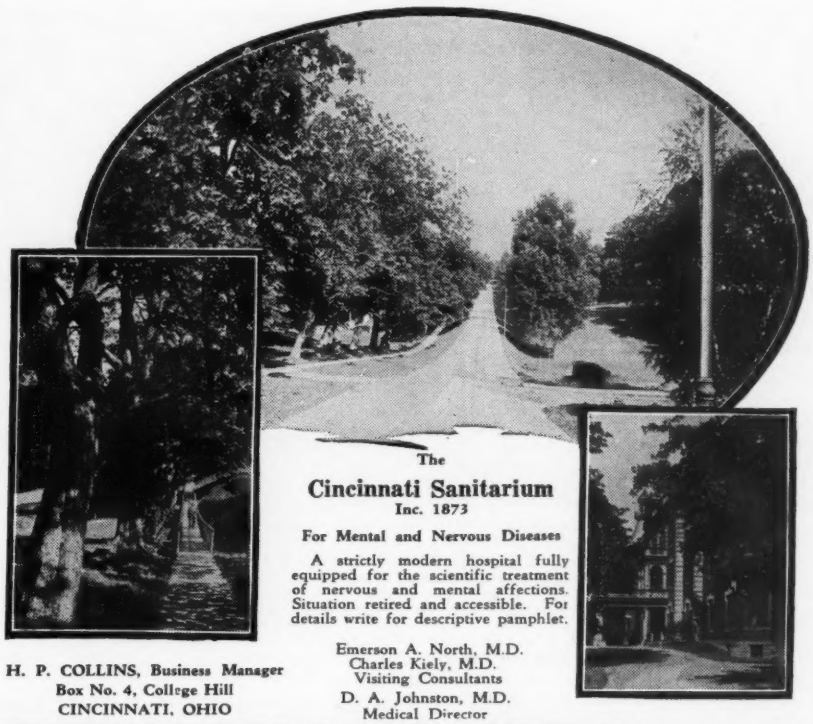

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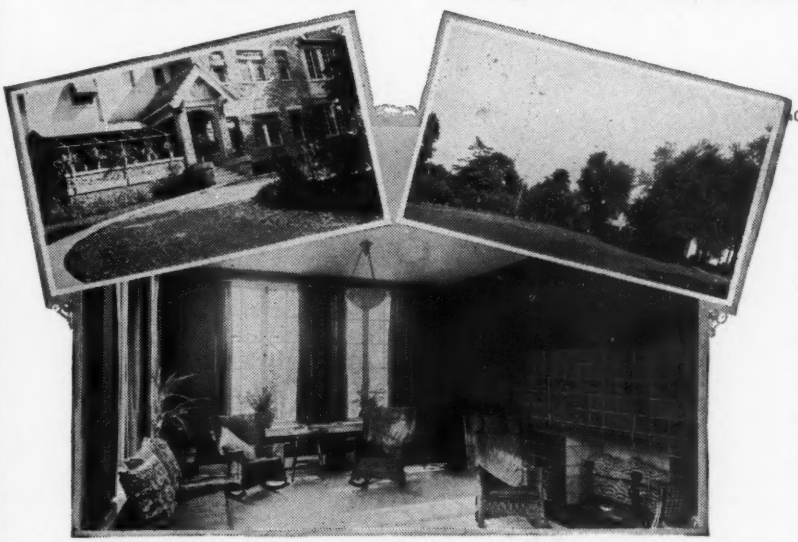

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WEIL'S DISEASE: A CLINICAL AND EPIDEMIOLOGIC REPORT OF FOURTEEN CASES*

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The following is a clinical and epidemiologic report of fourteen cases of Weil's disease occurring within a period of 2½ years in a single locality in Alabama. All diagnoses have been confirmed by laboratory procedure.

In April, 1940, a case of severe hepatitis came to autopsy. The patient was a 21-year-old white man, who had been ill 10 days with a progressive acute anemia, jaundice and fever. Before death he had expectorated bright blood. There had been continuous hiccough, vomiting and nose bleeding which eventuated in coma and, on the sixth hospital day, death. The etiology of his illness was entirely obscure. The postmortem findings were: enlarged liver, spleen and kidneys; massive intrapulmonary hemorrhage; and intense jaundice. Microscopic studies showed: massive intra-alveolar hemorrhage in the lungs; hemorrhagic extravasations in all viscera; diffuse acute degenerative hepatitis with active proliferation of liver cells; and, a pigment nephrosis. No insight as to the cause of this acute systemic disease was gained from studies of the routine sections. Silver impregnated preparations of all organs were made according to the Levaditi technic. After long searching, morphologically typical leptospira were recognized in only the kidney sections. A positive diagnosis of Weil's disease was made.

A review of the autopsy material over a five-year period revealed two similar cases in 1938. Silver preparations of tissues from these showed innumerable spirochetes in the kidneys of each (*Fig. 1*). At this time, the senior author recalled that several cases of jaundice had been hospitalized during the previous two years and that all had come from the same locality.

In June of 1940 two more cases were admitted to the hospital. Immediately, urine samples from these patients were injected into guinea pigs and in each instance the pigs died of hemorrhagic jaundice. Leptospira were demonstrated in the guinea pig organs by darkfield and by silver impregnation methods. A blood specimen from one of these patients was sent to the National Institute of Health and agglutination with Leptospira icterohemorrhagiae was reported positive in a titer of 1:3,000.

A search of hospital and clinical records revealed six other cases of acute illness accompanied by jaundice. Blood specimens from all six, collected in August, 1940, showed agglutinins for Leptospira icterohemorrhagiae in high titer. A survey of mine employees revealed agglutinins in the blood of three. In all, fourteen cases were available for study, five having occurred in 1938, two in 1939, and seven in a five months period of 1940 (April through August).

All were males between the ages of 21 and 39. Nine were white, five were colored. Nine were hospitalized, three died and were autopsied. All were employees of a coal mine in north central Alabama.

CLINICAL DATA

The disease began with an explosive onset of malaise, generalized muscular pains, fever, and

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often with a chill. The temperatures varied from 98.8 to 104° F. The pulse varied with the severity from 72 to 120 per minute. In the severe cases respiration was increased. Jaundice was present in 12 cases, appeared between the third to the ninth day of the illness and persisted for variable periods, but not exceeding eight weeks. In severe cases petechial hemorrhages occurred in the skin and mucous membranes. Cough and hemoptysis occurred in six; hemoptysis was alarming in three. Vomiting was present in twelve and severe in four. Hiccough was noted in five. Of four patients who were delirious, three died. Oliguria was present in four. Hiccough, delirium and vomiting were particularly marked in those who had urinary suppression. Pain and tenderness in the right upper quadrant were noted in the nine hospitalized patients and in two were severe enough to warrant consideration of acute cholecystitis. The blood pressure showed no particular change except in a fatal case in whom the pressure dropped to 80/30 mm. of mercury. The most severe symptoms and deaths occurred during the second week of illness. In two cases a transitory temperature elevation occurred in the third week.

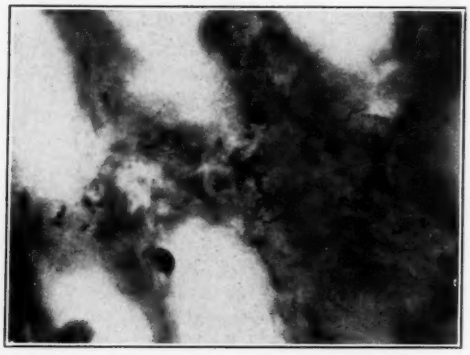

Fig. 1
Kidney showing Leptospira icterohemorrhagiae (high power).

The treatment was largely symptomatic since the diagnosis was unknown in all but two. In these two cases rigorous hydrotherapy (saline and glucose) and alkalization (citro-carbonate) were given, and in addition carbasone (p-carbaminophenyl arsonic acid) grams 0.25 twice daily for ten days.

Laboratory studies on nine hospitalized cases

DATA REGARDING ELEVEN CASES

Case Number	Race	Onset	Duration Days	Outcome	Laboratory Confirmation	
					Interval from Onset	Demonstration of Organisms or Agglutinins
1*	W	3-38	11	Died		Kidney section, Levaditi's stain
2*	C	6-38	8	Died		Kidney section, Levaditi's stain
3*	C	8-38	25	Recovered	24 months	Positive agglutination 1/100
4*	W	10-38	68	Recovered	22 months	Positive agglutination 1/1,000
5*	W	3-39	19	Recovered	17 months	Positive agglutination 1/1,000
6*	W	11-39	28	Recovered	9 months	Positive agglutination 1/10,000
7*	W	4-40	11	Died		Kidney section, Levaditi's stain
8	C	5-40	57	Recovered	3 months	Positive agglutination 1/100,000
9*	W	6-40	50	Recovered	22 days	Guinea pig inoculation with urine
					2 months	Positive agglutination 1/100,000
10*	C	6-40	20	Recovered	6 days	Guinea pig inoculation with urine
					7 days	Positive agglutination 1/3,000
					16 days	Guinea pig inoculation with urine
					2 months	Positive agglutination 1/100,000
11	C	8-40	11	Recovered	8 days	Positive agglutination 1/1,000

*Hospitalized. All cases were adults between 21 and 39 years of age.

Table 1

were as follows: icterus indices varied from 23 to 129 units. Blood chemical determinations, made on four, showed nitrogen retention varying from 62 to 200 mg. per cent nonprotein nitrogen. The blood Wassermann test was positive in one and negative in six. All cases presented white counts ranging from 10,600 to 27,700 cells per cubic millimeter. A progressive acute hemolytic anemia of some degree was usually present. In severe cases the hemoglobin dropped precipitously. In a fatal case the hemoglobin on admission was 68 per cent normal and within four days had dropped to 36 per cent. Albuminuria was marked in severe cases and negligible in the mild. The highest urine albumin value in a nonfatal case was 1.4 per cent, while in a fatal case the peak value was 0.35 per cent. Sediments of the urine contained red cells, white cells and casts in amounts that paralleled the severity of the disease. Bile was present in the urine of all hospitalized cases. The agglutination titer of the blood of one patient increased from 1:3,000 to 1:100,000 between the first and eighth week.

Postmortem appearances were those of systemic hemorrhages, jaundice and acute swelling of the liver, spleen and kidneys. Massive intrapulmonary hemorrhages were present. Microscopic examination of the liver showed an acute hepatitis which was characterized by swelling, degeneration, proliferation and diastasis of the liver cells (*Fig. 2*). The bile canaliculi were distended with bile. A marked edema and pigment nephrosis occurred in the kidneys (*Fig. 3*). Leptospira were found in silver preparations of only the kidneys, occurring in the interstitial tissues and tubules. Necroses with leukocytic exudate and extravasation of red cells occurred in the myocardium (*Fig. 4*) and kidneys. Thrombophlebitis was noted in sections of intercostal muscles (*Fig. 5*).

EPIDEMIOLOGY

The coal mine in question is situated near the center of a small unincorporated village and has been in almost continuous operation since 1880. It covers approximately 3,600 acres, of which 620 are worked at the present time. There are eight entrances, one seam of coal is mined, and operations are confined to a single level at an average depth of 425 feet. Eight hundred men are employed; of these, twenty are pumpers and five are engaged in the maintenance of pipe lines.

There is nothing unusual to differentiate this mine in any important way from others in Alabama except that it is extremely damp. As described by the superintendent, it is "one of the wettest in Alabama," the coal is wet and dust hazards are nonexistent. Approximately six tons of water are evacuated for each ton of coal. The amount of water discharged at the surface averages two million gallons a day; this is increased during the rainy season because of seepage and direct drainage from openings to the surface. Mules have not been used in the mine since 1937.

The village consists of approximately 120 frame houses scattered along an arterial highway and the side of an adjacent slope. Sewage disposal is by outdoor toilets of the pit privy type, many of which were in poor repair. Water is received from a public supply of dependable

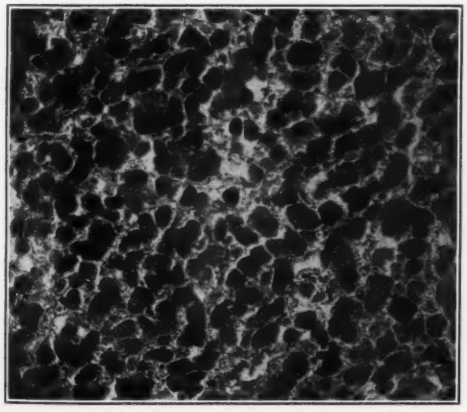

Fig. 2
Liver showing acute hepatitis; swelling, degeneration, proliferation and diastasis of liver cells.

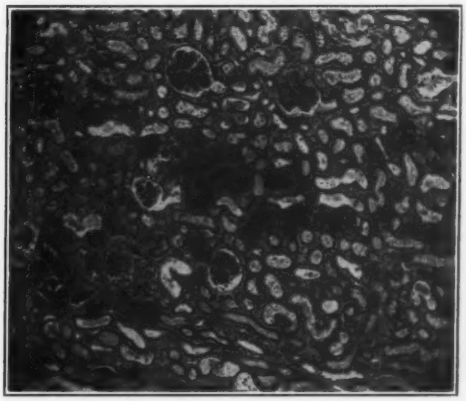

Fig. 3
Kidney showing marked edema and pigment nephrosis.

source. The village houses only about 30 per cent of mine employees; many live in contiguous areas, while a few come from appreciable distances.

Evidence of Rats.—Rat runways were in evidence about the premises of most residences and stores, but these conditions are not different from those usually prevalent in local industrial or rural areas.

Rats were commonly seen in the mine and about the bath house. Miners said that they were quite tame and often came to within five or six feet at lunch time. While rats were described as numerous, those experienced in mining operations did not consider their prevalence any greater than is ordinarily found in other mines of the area.

It had been noted on previous occasions, when operations were suspended because of strikes, that rats left the mine in large numbers apparently in search of food. In April, 1940, an old building near the main entrance, formerly used as a mule barn and for storage of grain, was destroyed. This, together with the destruction of an old rat-infested commissary building in June, 1940, was thought to have contributed to a disturbance and redistribution of the surface rat population. It was also apparent that there was an intermingling of the rat populations in the mine and on the surface.

Distribution of Cases.—Household contacts among eleven cases totaled forty-one and among these no illness of a similar nature was known to have developed. Only three cases lived in the village, three lived within a radius of 2½ miles, the remaining five resided in widely separated areas from four to twenty miles distant from the mine. Investigations, including food purchases and water supply, eliminated all possibilities of a common source of infection other than employment in the mine.

The specific duties of one deceased miner are not known, four were coal loaders, one a "dynamite shooter," while the remaining five were employed on the pipe maintenance crew either to maintain pipe lines or to operate water pumps. Both of the latter duties are quite similar and require working in areas where water is prevalent and sometimes quite deep. They are also required to work throughout the mine rather than in any one particular locality. Most of these men knew each other well from close association on duty and it occasionally happened that a man, replacing one who developed Weil's disease, subsequently contracted the disease himself. Three of the four coal loaders reported that they worked in water or damp areas.

Survey of Pumpers and Pipe Maintenance Crew.—Eleven cases represented persons who were severely ill for prolonged periods. All developed jaundice. It was considered likely that other less severe cases had occurred which, because of their mildness and lack of medical attention or through failure to develop jaundice, might not have been recognized. To permit a retrospect diagnosis, consideration was given to the taking of blood specimens from all miners for agglutination tests. Practical difficulties made it advisable to limit the study to men who were more directly exposed to water. Since many of the cases had occurred among workers engaged in operating pumps and maintaining pipe lines, it seemed logical to confine the survey to the

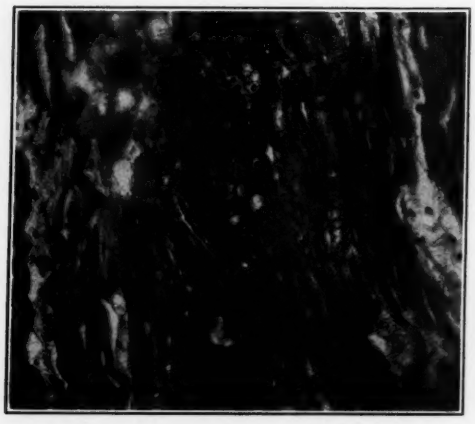

Fig. 4
Myocardium showing necrosis with leukocytic exudate and extravasation of red cells.

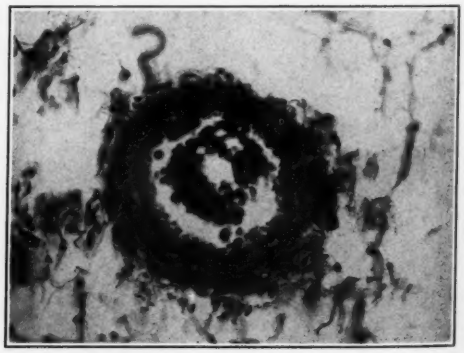

Fig. 5
Thrombophlebitis, intercostal muscle.

SURVEY OF PUMPERS AND PIPE MAINTENANCE CREW (9/12/40)

Number	Term of Employment*	History	Agglutination Test	
			Interval from Onset Months	Result
1	3 yrs.	"Yellow jaundice" of 3-4 weeks' duration, not hospitalized	24	Positive 1/100
2	6 mos.	Sick and away from work 2 weeks with chills, fever, headache, nausea and vomiting, pain in calves of legs, no jaundice. Diagnosed as influenza	5	Positive 1/100
3	4 yrs.	Sick one week with badly infected finger. Chills, fever, no jaundice. Lost only one day from work	3 ?	Positive 1/100
4–16	Employed 8 mos. to 8 yrs.	None of significance		Negative

*Before onset of disease.

Table 2

remaining members of this crew who were not known to have developed the disease. Sixteen such individuals were available. The blood of three showed agglutinins in dilutions sufficient to be diagnostic; only one gave definite history of an acute illness accompanied by jaundice. Data regarding the three cases are shown in *Table 2*.

It is reasonable to suppose that other mild or subclinical cases might have been discovered had blood specimens been examined from those engaged in the mining and loading of coal. Unquestionably, however, the greater risk is suffered by those who operate pumps and maintain pipe lines. Twenty-five men customarily work on this crew and, during 2½ years, eight have contracted Weil's disease.

Examination of Rats.—As part of a control program rats were trapped in the mines and were trapped and poisoned on the surface. To determine the extent of infection with Leptospira icterohemorrhagiae, the kidneys of eighty-six trapped rats were examined by darkfield with findings as shown in *Table 3*. Histologic preparations of positive rat kidneys showed the leptospira distributed in great masses lining the tubules.

EXAMINATION OF RATS

Number	Source	Darkfield	
		Positive	Negative
68	Mine	11	57
18	Surface	0	18

Table 3

Failure to recover Leptospira icterohemorrhagiae from the small sample of surface rats is not sufficient evidence to indicate their freedom from infection, especially since some intermingling of the rat population of mine and village is known to occur. It may be presumed that environmental circumstances are more favorable for transmission of leptospira in the mine and that the percentage of mine rats which are infected is, perhaps, greater than for rats on the surface.

Laboratory Procedure.—Only full grown rats were examined. After immersion in 8 per cent carbolic acid solution the abdomen was opened, the kidneys removed with sterile instruments, placed in sterile bottles and refrigerated until examined later the same day.

The kidney was divided into equal halves by longitudinal section. Fluid expressed from the cut surface was examined by darkfield for at least fifteen minutes before being discarded as negative. The second kidney was always examined if the first proved negative.

To verify the reliability of the darkfield procedure in our hands, guinea pig inoculations were made of thirty rat kidneys (24 negative and 6 positive by darkfield).

Kidneys were ground in sterile sand and physiologic salt solution, and 0.5 c. c. amounts of the supernatant inoculated intraperitoneally into 12-18 ounce guinea pigs. The animals were observed for a minimum of 12 days, usually longer. Temperatures were taken daily. On pigs developing a temperature of 39° C. or higher, blood was collected from the ear, defibrinated and examined by darkfield. Animals developing fever or jaundice and those dying from any cause during the period of observation were autopsied, the gross pathology observed and attempts made to demonstrate leptospira by darkfield, culture and tissue sections stained by Levaditi's method.

Of six pigs inoculated with rat kidneys containing leptospira on darkfield examination, five developed typical leptospirosis and Leptospira icterohemorrhagiae were recovered on autopsy. Jaundice developed between the sixth and thirteenth day, three died between the tenth and fifteenth day, two were killed on the tenth day. At autopsy there was marked jaundice of the

skin and subcutaneous tissues with punctate hemorrhage of the subcutaneous tissues, lungs and abdominal organs. The liver was frequently enlarged, the spleen usually of normal size. The sixth pig was refractive, for it later proved resistant to inoculation with culture material which, under identical conditions of administration, produced leptospirosis in two other animals.

Cultures were made using Schuffner's modification of Verwoort's media as described by Meyer, Stewart-Anderson and Eddie.[1] Six isolations of leptospira were made; two directly from rat kidneys and four from guinea pigs. Blood was usually the best material for culture, since it was less often contaminated. However, in a few cases contaminated cultures were obtained from the kidneys when no growth was obtained from the blood. Urine was the most disappointing of all material for culture and direct examination.

Examination of Mine Water and Muck.—The hazard associated with water which has been contaminated with rat urine depends, to a large extent, on the ability of the organisms to survive. Leptospira do not live in media that are distinctly acid and are not found in water of pH 6.8 or less. As might be expected, the pH values for streams and pools of water in this mine were usually high. Of fifty-five samples collected from different sources, the pH of 49, or 89 per cent, ranged from 6.9 to 7.9.

Direct examination of mine water and of muck collected from the bottom of pools revealed large numbers of leptospira morphologically typical of Leptospira icterohemorrhagiae. However, such findings are of no significance, for non-pathogenic leptospira of similar morphology are commonly found in natural waters. Identification requires that virulence be demonstrated by infection of animals with the production of characteristic pathology.

Concerted efforts to isolate pathogenic leptospira by the inoculation of young guinea pigs with water and muck failed. This was not discouraging, for it would appear that the chances of recovering the organisms are quite small.

Laboratory Procedure.—Fifty-one samples of water of pH 6.8 or higher, collected from different sources, were pooled into two lots. Ten half-gallon samples of pH 6.8 and above were collected from areas selected because of epidemiologic indications. Twelve pigs were prepared by shaving the abdomen and scarifying the exposed skin. Each was soaked in a single specimen of water for one hour.

Ten samples of water of 60 c. c. each were pooled and centrifuged at high speed. One c. c. of the sediment and contained water was inoculated into each of four pigs, two subcutaneously and two intraperitoneally.

All animals were observed for 29 days and all survived without incidence.

Six samples of muck were collected from areas where infected rats had been trapped. They were shaken in a Kahn shaking machine for thirty minutes and after slight settling one c. c. amounts of supernatant were injected intraperitoneally into young guinea pigs. Twelve pigs were inoculated, two from each sample. Eight pigs developed temperature of 39° C. or higher between the second and fifteenth days; this was attributed to the injection of grossly contaminated material and to respiratory infection. Blood specimens taken during the fever were negative for leptospira by darkfield examination. Autopsy findings were not significant.

REACTION OF MINE WATER

Number of Samples	pH Range
6	6.0-6.8
49	6.9-7.9

Table 4

CONTROL

Extensive control measures were taken to prevent further infection of miners. This consisted of a thorough rat elimination program both in the mine and for a two-mile area on the surface of the ground commencing at the mine opening and including all of the village. In addition to the actual control measures, an intensive educational program was conducted among the miners, their families, and the operators of the mine.

Experienced men were employed to carry on a poisoning program and then a trapping program in the area on top of the ground. A crew of miners, after special training in trapping rats, was given the problem of eliminating rats in the mine itself. Poisoning was not attempted because, with the type of ventilation system used, resulting odors would have entered the entire mine.

The program in the area above the ground was conducted with thoroughness and, in accordance with accepted methods of estimation, over 5,000 rats were destroyed. Inadequate records were kept by the miners and the number destroyed in the mine is unknown. However, after completion of the program, rats were seen infrequently.

The educational program was designed to keep the people living in the area, and working in the mine, conscious of the danger connected with the presence of rats. Emphasis was placed on the importance of removing all sources of food, or the elimination of rats by starvation. Miners were instructed to retain all lunch scraps in their metal lunch boxes. Portable box and can privies

1. Meyer, K. F.; Stewart-Anderson, B.; and Eddie, B.: Canine Leptospirosis in the United States. Jour. Amer. Vet. Med. Assn., —:710-729 (Dec.) 1939.

were designed for the operators for installation in the mine to eliminate human excreta as a source of food. The pit privies serving the village were reconditioned and made rat-proof. Consideration was given to rat-proofing the mine entrance, but, due to certain mining operations, this was considered inadvisable. Miners were instructed to carry their own water supply for drinking. Those refusing were excluded from the mine. The number of pumps was increased in an effort to keep the mine as dry as possible.

The results of this control program have been gratifying, as no further cases have occurred.

SURVEY

Weil's disease has never previously been reported in Jefferson County, Alabama. Though the probability of occasional scattered infections cannot be eliminated, it would seem that such cases must be quite rare.

A review of all death certificates for the 2½ years of study disclosed four deaths which were preceded by jaundice and for which the cause of death was not specifically shown. The incomplete clinical and pathologic data, gathered in retrospect, do not permit etiologic diagnoses. All four were negroes whose occupations were given as laundress, dishwasher, laborer, and domestic servant.

To determine whether dogs might serve as a reservoir for infection with either the canicola or icterohemorrhagiae strain of leptospira, material was obtained through local veterinarians from nine dogs acutely ill and jaundiced. The examination of blood by darkfield and cultural methods and by guinea pig inoculation failed to demonstrate leptospira. Liver and kidney obtained from three animals were likewise negative and tissue sections stained by Levaditi's method failed to demonstrate the organisms. The number of animals examined is obviously too small to eliminate dogs as a reservoir of infection. Jaundice among dogs in Birmingham, however, is quite rare and occurs more often during the fall and winter months.

In an effort to judge the possibility of Weil's disease as an occupational hazard among miners, 110 water samples were collected from ten of the larger mines in the district to determine the hydrogen-ion concentration and the consequent ability of such water to permit the survival of Leptospira icterohemorrhagiae. Blood specimens of sixty-one pumpers were obtained and examined for agglutinins to determine past infection. The results of this survey are shown in *Table 5* and indicate that past infections have been infrequent or absent. All mines are infected with rats and in those in which the water is predominantly alkaline a definite and potential danger would seem to exist.

SURVEY OF OTHER MINES

Mine	Water Samples		No. Pumpers Tested*
	Number	pH Above 6.8 Per Cent	
A	15	100	
B	16	94	6
C	6	83	
D	10	80	
E	10	80	8
F	4	75	
G	11	64	33
H	17	47	12
I	7	43	2
J	14	21	
10	110	68	61

*Agglutination tests all negative.

Table 5

SUMMARY

A clinical and epidemiologic report is given of fourteen cases of Weil's disease occurring in a single mine in north central Alabama between March, 1938, and September, 1940. All were confirmed by laboratory methods. Following the institution of control measures no further cases have occurred.

Leptospira could not be demonstrated in nine dogs, acutely ill and jaundiced.

A survey of ten mines was undertaken to determine the hydrogen-ion concentration of water and its consequent ability to permit the survival of Leptospira icterohemorrhagiae. In seven mines the water was predominantly alkaline. Agglutination tests on bloods of sixty-one pumpers were negative. Although past infections appear to have been rare or absent, a potential danger exists.

The true incidence of Weil's disease is probably greater than realized and will be determined more definitely only when physicians become fully acquainted with the disease.*

*We wish to express our appreciation to Dr. Carl L. Larson, of the National Institute of Health, who performed all agglutination tests on the eleven surviving cases of Weil's disease reported in this study.

DISCUSSION (*Abstract*)

Dr. C. L. Williams, U.S.P.H.S., New Orleans, La.—Having been engaged for many years in studying and practicing rat control for the purpose of preventing rat-borne diseases, the feature that strikes me most forcibly is the attention focused on the rat from a new angle. It has been known for some years that rats transmit Weil's disease, but we have been prone to regard its occurrence as a rarity. This paper, however, clearly indicates that, like other rat-borne diseases, we must expect to find it pretty thoroughly spread over the United States and appearing in ever-increasing numbers of cases.

Rats carry more human diseases than any other known animal. Besides Weil's disease, a partial list includes two pestilences, bubonic plague and typhus fever; two infectious diseases known to be transmitted by rat bites, and several human internal parasites, as well as some known diseases of domestic animals and very probably others not yet demonstrated as transmitted by them.

Rats are suspected of carrying other diseases, among them leprosy. A recent publication indicates that they are in fact susceptible to human leprosy. In addition to their disease spreading proclivity, rats cause a large economic loss.

Considering the harm that rats do to us it seems truly remarkable that mankind has not undertaken a far more vigorous campaign to rid itself of this menace.

One difficulty, of course, has been the tendency to restrict rat destruction to narrowly confined campaigns which reduce numbers but do not eradicate the species. Following a campaign it is only a short time before the rat population is fully restored.

It is my conviction that we will get nowhere in our attempts to control rats until there is set up in all health departments a division of rat control on a comparable status to the other recognized permanent divisions of the health organization, and until maintenance of rat infested premises shall be recognized and treated as a sanitary violation like any other sanitary violation which must be rectified by the owner or tenant of the premises in each case.

I think that the rat control division of the health department should consist of experts who can advise as to the best methods to be adopted, and inspectors who are competent to determine when premises are infested. This personnel will make inspections at regular intervals, determine infested premises, instruct the owners or tenants how to rid them of rats and enforce laws requiring the property owner or tenant to maintain premises free of these vermin.

Dr. Denison (closing).—Dr. Williams spoke of the difficulties of rat eradication. In mines, these difficulties appear insurmountable. It should be realized that in this particular mine there are over a hundred miles of passage, that the mine is heavily infested, and that, regardless of how effective or how thorough a rat elimination program may be conducted, a large residue of rats will always remain. Control seems to be a problem of perpetual rat trapping and elimination of as many rats as possible by starvation.

Unfortunately, the best work was done on the surface, but the surface rat population did not seem to be important in so far as Weil's disease was concerned. With alkaline water in the mine and rats still prevalent, there will always be a problem that requires constant attention.

VENEREAL DISEASE CONTROL IN ST. LOUIS*

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JOSEPH C. WILLETT, D.V.M.

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World War I provided a stimulus for doing something about venereal disease throughout the nation. In St. Louis, this interest was mainly directed at the treatment of individuals, with only secondary significance attached to the necessity of finding new cases and of maintaining the infected patient under treatment until he or she was rendered at least non-infectious. The importance of follow-up service, that is, case-finding and case-holding, were minimized in the control of venereal disease, the major stress being laid upon treatment of individuals. A large centralized clinic was situated in a municipal building and this clinic was frequented by all types of people, colored, white, men, women, children, and prostitutes. This situation was obviously unsound from the public health point of view, a fact which was recognized for many years by our medical and civic leaders.

With the new impetus given to venereal disease control by Surgeon General Parran, steps were taken by the St. Louis Division of Health and many prominent civic organizations towards the establishment of a venereal disease control program. As a result, in April, 1939, an ordinance was enacted which stressed the public health control of venereal disease. By this new ordinance treatment was made more widely available through decentralization to class A hospital polyclinics. Thus treatment was removed from the direct control of the health division. The health division has since concerned itself with its proper interest, the protection of the community by stressing case-finding and case-holding. It, thereby, puts into practice the well-known principle of public health which dictates that an official public health agency should concern itself primarily with community health and only secondarily with individual health.

The present plan of organization in St. Louis

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*From the Venereal Disease Control Service and the Laboratory Section of the St. Louis Division of Health.

consists of centralized administrative and follow-up offices to which is attached a diagnostic and a consultation service; decentralization of treatment facilities at six class A hospital polyclinics which are not under the direct control or supervision of the health division.

The professional personnel of this service consists of one whole-time supervising physician, four part-time clinic physicians, one supervising public health nurse and eight public health nurses. The personnel has been selected on the basis of professional qualifications and every effort is made to encourage further staff education and research. The staff of this service attempts in every way to cooperate with all medical and civic agencies in furthering the control of the venereal diseases. It actively participates in the teaching of methods in venereal disease control to the public health nurses at the School of Public Health Nursing at St. Louis University.

DIAGNOSTIC FACILITIES

An active follow-up service cannot operate unless it is built on the firm foundation of accurate diagnosis. This basic principle in the control of venereal disease was at once recognized and every effort was made by this service to insure proper diagnosis of all patients. Regardless of the idealist in medicine, physicians still lean heavily upon the laboratory for the diagnosis of the venereal diseases, especially syphilis. This tendency could not be ignored. Hence the laboratory section of the St. Louis division of health under the direction of the health commissioner undertook to survey all private clinical and hospital serologic laboratories. The conditions were such as to render it necessary to improve by standardizing at least one acceptable serologic test for syphilis. The 34 private clinical and hospital laboratories agreed to accept the leadership of the health division in the establishment of better serologic performance. The Kahn test was adopted and certain minimum requirements, modeled after the recommendation of the United States Public Health Service,[8] were accepted by all. The laboratory section, through the medium of furnishing, free of cost, all of the Kahn antigen, instructions in serologic technic, consultation and numerous selected check specimens, accomplished the task of the standardization of the Kahn test in the laboratories of St. Louis.[3] The names of the laboratories meeting all requirements were circularized to all practicing physicians and to all hospitals and institutions in the city. In order to prevent recurrence of faulty performance, the laboratory section maintains a constant check upon all laboratories approved by the St. Louis Division of Health.

Similar work has been done in the same laboratories with reference to the microscopic examination for gonococci.

In order to cope properly with the problem of gonorrhea, routine gonococcus culturing was instituted in the laboratory section. In all of these undertakings for the improvement of venereal disease laboratory work the venereal disease control service has actively cooperated with the laboratory section.

We are always striving to improve the clinical diagnosis of the venereal diseases and to maintain it on a high level in the venereal disease control service and at the cooperating clinics. All patients entering the diagnostic clinic receive sufficient medical examination for the diagnosis of the venereal disease and classification into its stage; at the cooperating clinics a complete medical examination is given to all patients.

An active consultation service for the practicing physician is maintained at the health division. This is rendered without charge or embarrassment to patient or physician.

FOLLOW-UP SERVICE

The most significant function of the present venereal disease control service is the maintenance of an active follow-up service for infectious cases. Case-finding is done through the medium of contact tracing on all cases of venereal disease in which it is possible to obtain information concerning exposures. This is done via one or more of the following methods: first, attempting to have the patient cause the examination of all individuals from whom he may have contracted the disease and all whom he may have infected. Correspondence is used in many cases and is frequently successful as well as inexpensive. Our most successful method is through home visiting by public health nurses.

Various blood test surveys, such as selective service system examination, have proven of value in revealing many cases hitherto undiagnosed. In seeking contacts from diagnosed cases, we find that the majority of patients, if properly approached and assured of strict confidence, will reveal all of their exposures. The physicians and public health nurses associated with this service have been especially trained in

this type of interview. The patient giving such information in no way becomes involved in the follow-up of the contacts named and is assured of complete confidence.

It is not enough to find a case and to make treatment available, but we must carry through and see to it that all potentially infectious patients go regularly for their scheduled treatments. The efforts at case-holding are graduated according to the present day accepted relatively infectious period, for example: primary, secondary, and early latent syphilis are given priority in the checking of treatments received and in the rapidity with which follow-up is done when a lapsed treatment occurs. Follow-up is actively used in all cases of early syphilis at weekly intervals until the patient has received a minimum of 20 arsenicals and 20 heavy metals. Cases of late syphilis are followed as the case load of early syphilis permits. The other venereal diseases are similarly followed. The public health significance of this, we believe, is obvious in so far as late syphilis is more of an individual or socio-economic problem, whereas early syphilis is most certainly a community health problem.

TREATMENT

It cannot be denied that treatment is still a most important link in the control of the venereal diseases. Six St. Louis hospital clinics have agreed to cooperate in this program by accepting for treatment at the small remuneration of 50 cents per treatment all cases referred to them via the St. Louis division of health. The records of such cases in these institutions are made available to the representatives of this service, and are checked at weekly intervals for the purpose of following all infectious patients who may have lapsed. In the treatment decentralization plan, the private practitioner was not forgotten. He is referred all patients who, upon questioning, are found not to be medically indigent. In turn, for this service, the physician is supplied free antiluetic drugs.

The health division does not treat venereal disease patients and it does not interfere with the clinics nor the physicians in the standard treatment of the venereal diseases. Research in therapy is encouraged.

A very special problem is always created when pregnancy is complicated by syphilis. In order to make the task of caring for pregnant patients as simple as possible, in February, 1940, representatives of the two university hospitals (St. Louis and Washington University Medical Schools) decided to accept cases of pregnancy with syphilis for care in special clinics at the two hospitals. From this period on, it became possible in St. Louis for the medically indigent pregnant woman with syphilis to obtain prenatal care and syphilis therapy at the same clinic, under the direction of the same physician, at the same visit.

PROSTITUTION

For years prostitution flourished and thrived at the expense of both the community's health and its wealth. With the organization of the present program prostitution was recognized as one of the important problems in our local venereal disease control program, and it was upon the following premise that the health division acted: whoever becomes sexually exposed to many different individuals is most likely to become infected and when once infected is certainly a most prolific source of infection to others. Hence, we concerned ourselves with ways and means to lessen the number of contacts possible. Considerable resistance was and is still being met in accomplishing our purposes. At the outset of this program prostitutes in known houses were responsible for over 50 per cent of the infections occurring in males. At the present time it is estimated that between 15 and 20 per cent of the venereal diseases in males are directly due to prostitution.

It is evident that, even though much has been accomplished towards the lessening of commercial promiscuity, the final goal has not been attained. Until all official agencies, across whose paths the prostitute must travel, recognize their potential danger to the health of the community, dispel their ideas of security via routine medical inspection, and act only to the best interest of the community, the problem will remain a major one in venereal disease control.

Since the establishment of the defense industries in and around St. Louis, it is again becoming apparent that prostitution is probably increasing in this area.

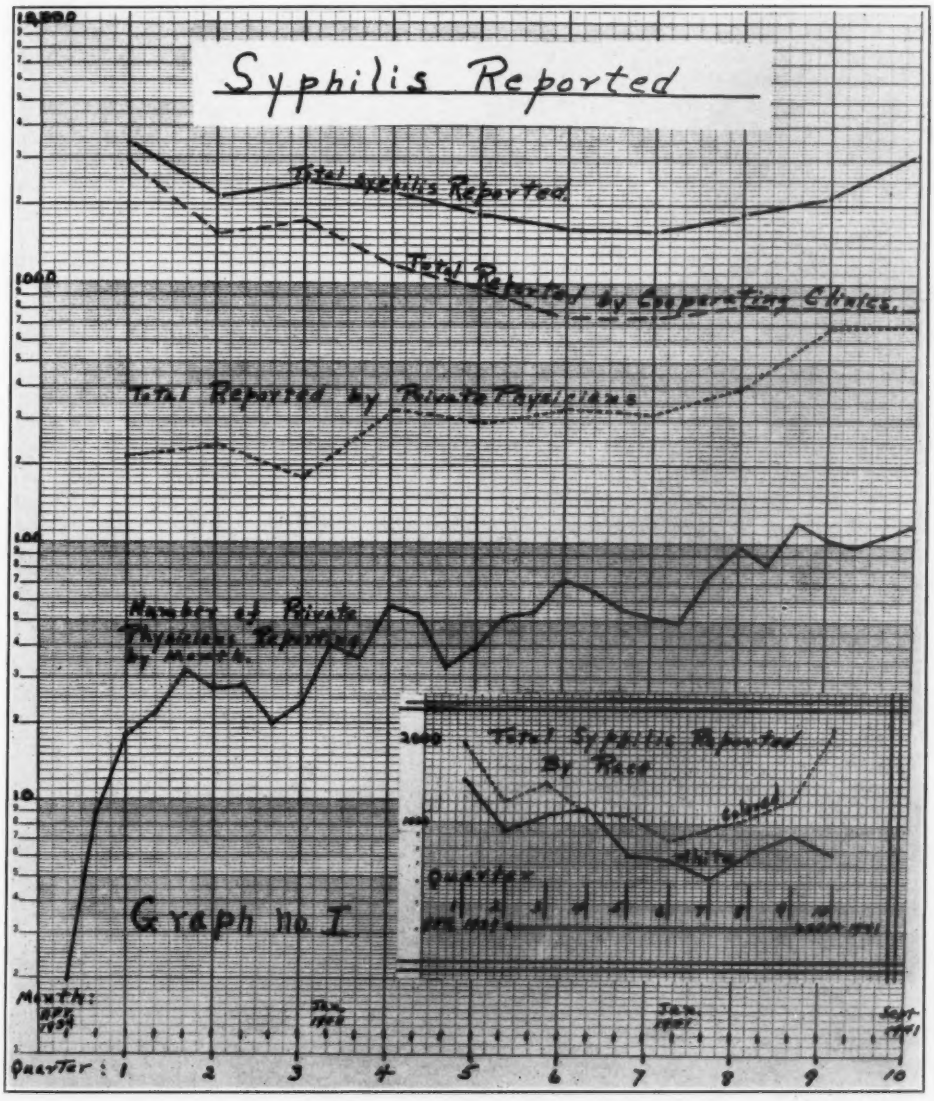
The method used in combating this problem was and is necessarily a slow and tedious one. In the main, it was taken step by step: first, examining at very frequent intervals and physically isolating all such individuals found to have definite evidence of a venereal disease; the next step was to request the police authorities to close all known houses of prostitution and to arrest

and have examined all individuals suspected of prostitution.

In this work, the health division is frequently called into court on writs of habeas corpus. The courts, in all but one case, have reacted favorably to the isolation of infected prostitutes.

RESEARCH

Unless the spirit of investigation is maintained and encouraged, medical organizations become stagnant and do not progress. As a result the laboratory section and the venereal disease control service have intimately cooperated on such


Syphilis Reported
Total Syphilis Reported
Total Reported by Cooperating Clinics
Total Reported by Private Physicians
Number of Private Physicians Reporting by Months
Total Syphilis Reported by Race
Graph no. I
Month:
Quarter: 1 2 3 4 5 6 7 8 9 10

Graph 1

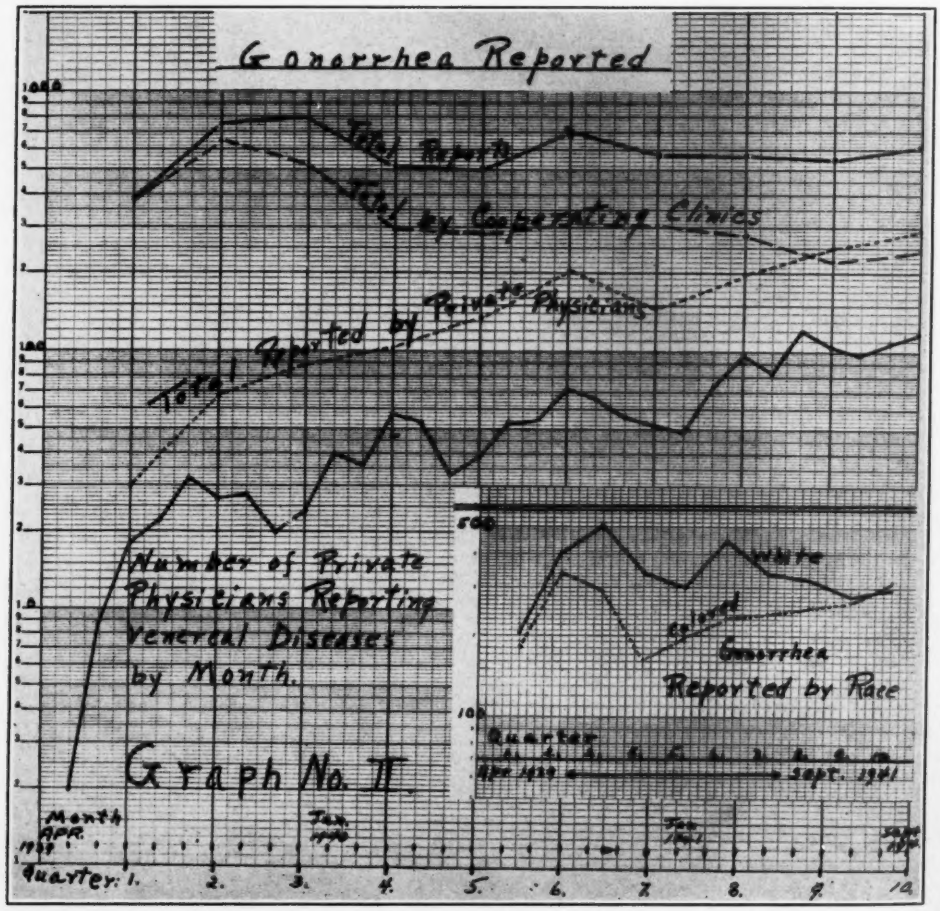
problems as the effectiveness of sulfathiazole in the treatment of gonorrhea in the female;[1] in many of the problems of gonococcus culturing;[2 5] and in studies concerning lymphogranuloma venereum[6 7] and chancroid. A special laboratory for research has been established through the cooperation of these two groups.

As a result of this investigative spirit, five-day treatment for syphilis by massive arsenical therapy has been under way for a year at the St. Louis Isolation Hospital. To date, the staff at Isolation Hospital has treated 115 cases of early syphilis with five known recurrences, all of which, based on epidemiologic findings, are believed to be reinfections.

RESULTS AND SUMMARY

In the analysis of total results in cities such as St. Louis, the question of race must enter and be evaluated. The estimated total population of St. Louis, as of January, 1941, was 815,308, of which 13.4 per cent were negroes. The rate per thousand for the total syphilis reported to date was 121.0 for negroes and 13.1 for white. It is obvious that the problem of venereal disease control among our negro population is of great significance.

In Graph 1 the total syphilis reported is analyzed according to the source by which it is reported and by race. It is to be noted that during the last three quarters there has been a



Graph 2

steady increase in the amount of syphilis. However, when this graph is analyzed further, a decrease is found in the cooperating clinics, whereas there is increased reporting by the private physician. The curve based on the number of private physicians reporting venereal diseases by month has been placed on this graph as well as on Graph 2 to show that more complete reporting by private physicians is to a great measure one of the causes for the increase in total syphilis reported. Therefore, it probably can be assumed that the curve for total syphilis represents only reporting and not actual incidence. As to the incidence trend for syphilis, we believe the curve for the cooperating clinics is more representative of trend, because of the completeness of reporting by these clinics. In tabular form (*Table 1*) the syphilis reported is analyzed and a definite decrease in early infectious syphilis in the white over this period of time is readily observed.

Graph 2 illustrates an analysis of the gonorrhea cases reported to date and shows approximately the same as in Graph 1. We do not feel that this graph represents a true picture of gonorrhea as it exists in St. Louis because we are quite aware that the amount of self-treatment, drug store prescribing, and physicians failing to report gonorrhea is still quite high. The other venereal diseases, such as lymphogranuloma venereum, chancroid and granuloma inguinale, are given their due attention in this service. However, while their number is relatively small and their significance is not nearly so great as that of syphilis and gonorrhea, we do not feel that we should burden you with further detail.

The question of reporting by private physicians is graphically illustrated in Graphs 1 and 2. It shows a rather steady and consistent increase in the number of physicians reporting. In this city, there are approximately 1,512 physicians, of whom 537, or 35.5 per cent, have reported venereal disease. Data, obtained by questionnaires sent out to physicians requesting information as to whether or not they treated venereal disease, indicates that about 45 per cent of physicians replying treat venereal disease. This would indicate that reporting is fairly good, but is still incomplete.

When standardization of serologic tests was undertaken in all hospital and private clinical laboratories, fear was expressed by some clinical pathologists that there would be drastic inroads on their volume of serologic work because of the extensive availability of free testing. In view of this fear it is well to note in *Table 2* that out of the eight private clinical laboratories, seven had definite increases in their volume of serologic tests and the average increase for all eight laboratories was 19 per cent. The total increase in serologic testing by all laboratories, public and private, amounted to 24 per cent; in

SYPHILIS CASES REPORTED TO THE VENEREAL DISEASE CONTROL SERVICE

	1939 April to Dec.		1940		1941 to Sept. Inc.	
	W	C	W	C	W	C
Total syphilis reported	3488	4510	3249	4069	2450	4556
Total primaries and secondaries	240	161	246	187	183	223
Total early latent	1017	2161	709	1465	578	2112

Table 1

NUMBER OF KAHN TESTS REPORTED BY THE PRIVATE CLINICAL LABORATORIES TO THE ST. LOUIS HEALTH DIVISION FOR SEVEN CORRESPONDING MONTHS DURING 1940-1941

Private Clinical Laboratories	1940 March to Sept. Inclusive	1941 March to Sept. Inclusive	Per Cent	
	No. Kahn Tests	No. Kahn Tests	Increase	Decrease
A	394	837	112	
B	163	394	142	
C	469	1075	129	
D	397	461	16	
E	3413	3492	2	
F	691	711	3	
G	1338	1182		12
H	466	577	24	
Total	7331	8729	19	
Total of all laboratories, public, private and hospitals, 34 laboratories	107,509	133,746	24	

Table 2

the public laboratories this figure includes selective service system tests and other official examinations.

In the six cooperating clinics, from January, 1940, to September, 1941, there has been an average monthly load of 4,538 syphilis cases with an average number of 52.4 treatments per patient.

Since this service was inaugurated, there has been a total of 17,098 home visits to delinquent patients and contacts. From January 1, 1940, to the present date a total of 2,726 venereal disease contacts was found and examined; of this group 19 per cent were found to have venereal disease.

The total number of individual prostitutes examined in 1939 was 1,744; in 1940, 1,155; to date in 1941, 1,297. One thousand fourteen detentions of prostitutes for treatment have been made since the present service commenced.

In conclusion, we feel that most of the ground work of the venereal disease control program in St. Louis has been laid and that the private practitioners and private clinical pathologists have not been deprived of their legitimate volume of patients and laboratory work.

*The authors wish to acknowledge the sincere cooperation of Dr. J. F. Bredeck, Health Commissioner, and Dr. Leroy J. Stephens.

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DISCUSSION (*Abstract*)

Dr. John V. Lawrence, St. Louis, Mo.—I hope we can have a recrudescence of chemical and mechanical prophylaxis.

If infection of our soldiers by our local communities can be prevented, certainly this is more than we can accomplish in civil practice.

It is only in the regimental forces that prophylaxis may be effectively applied. Perhaps it can also be done in industrial organizations, but I doubt it. I have tried it in student organizations, but unfortunately the series was not large enough to learn how effective it was. Prophylactic measures were started in the Army in 1908 and proved to be very effective, and I think the practice should have a recrudescence now.

Dr. Gillick has traced the effectiveness of concerted action in venereal disease control in St. Louis and has proven what can be accomplished in one community. It is equally important that every community in the United States take part in venereal disease control. The effects of excellent control in a single community would be nil for the country as a whole if all communities were not at the same time making similar strides. If any one significant community neglects to control venereal disease within its boundary, that community would be a national prostitute seeding and infecting neighboring and far distant communities.

In the beginning of our public health attack upon syphilis provisions for pursuing treatment far enough to prevent late manifestations of the disease are unavoidably inadequate and in some places lacking. Communities would do well to study ways and means of extending the Federal public health program by providing periodic treatments of useful ambulatory persons in order to obviate the cost of maintenance of patients with late syphilis in public hospitals for the insane.

Much can be done to prevent the late stages of the disease within the scope of the present program for intensive treatment of early syphilis. In treating a case of syphilis we deliberately destroy the patient's acquired immunity to the disease and we attempt to cure him by drugs alone. Unless the early treatment of syphilis is adequately administered with clock-like precision the late manifestations of disease will not be avoided. Lapses in treatment or "rest periods" benefit only the invading organism by allowing it to become acclimated to arsenicals and bismuth and to become more firmly entrenched. A patient with 300 arm and hip injections with lapses or "rest periods" may be no nearer cure than a patient with 60 adequate treatments properly spaced. A little treatment is worse than none at all. Enormous responsibility is therefore assumed by the physician in treating his patient diligently and effectively during the time at his disposal for a given case.

The most essential element in effective treatment is the active cooperation of the patient. Responsibility for patient cooperation rests primarily with the physician. More can be accomplished by sympathetic understanding in the patient-physician relationship than by indirect methods of follow-up and case-holding. The physician should understand and guide the psychologic reaction of the patient to his disease. In private practice the physician has optimum opportunity to study the mental hygiene of his patient. In clinic practice the intimate contact with the patient can best be

made through the medium of social service which supplies the "family" element of the clinic physician. The tireless effort of the public health department through its nurses in following up patients and in keeping them faithful to treatment schedules should supplement, but not replace, the responsibility of the physician.

Patient cooperation is essential in all successful programs. It can be obtained. Perhaps the group of clinic patients most unfaithful to treatment schedules is the group with gonorrhea. Treatment lapses in this group have rendered all forms of treatment pitifully ineffectual during the past 100 years. Until recently, in Washington University clinics less than 6 per cent of the patients continued treatments for gonorrhea to a satisfactory cure. During a recent 15-month experiment for actual control of gonorrhea 83 per cent of all patients registered have remained on treatment until discharged as clinically well or they are still under observation. This group comprised 326 patients, of which 83 per cent have fully cooperated, 5 per cent were transferred to other places of treatment, and 12 per cent were lost.

Cooperation of the patient is a responsibility of the treating physician. He must accomplish it either by his own efforts or delegate the task to a skilled social worker under his supervision. Lack of cooperation by the patient indicts our medical care, renders treatment ineffectual, damages the patient, and saddles our communities with the hospitalization of thousands whose usefulness is largely lost.

Dr. Goronwy O. Broun, St. Louis, Mo.—The standardization of laboratory technic to which Dr. Gillick referred has been a very valuable thing to the laboratories themselves as well as to the venereal disease control program. That also was carried out in a highly creditable manner and is functioning very well.

We have definitely been able to observe in our own clinic a decline in the infectious stages of syphilis, particularly in the white population. In fact, the change in the types of cases under treatment is becoming rather striking.

I should like to echo Dr. Lawrence's remarks about the necessity of concentrating on some of the later stages of syphilis as well as the early stages, and I hope that the decline in the total number of cases in the infectious stage will enable us to turn our attention to the later stages.

Still another problem is being raised by the intensive five-day treatment of syphilis. This may change the entire aspect of the treatment program. It is being tried in several of the clinics, including our own, and this may produce very profound effects upon the clinic population.

I should like to point out the necessity of careful follow-up on these cases that receive intensive treatment, even though treatment is not continued.

Dr. J. A. Lewis, Louisville, Ky.—Facilities for gonorrhea culture are available for only three of the 119 Kentucky venereal disease clinics and there seems to be no prospect of obtaining these facilities for the remaining 116 clinics. Smears are unsatisfactory when negative because too many females infected with gonorrhea have negative smears. This has been shown by comparative studies of the efficiency of smears and cultures. Decision to treat or not to treat with sulfathiazole women suspected of infection with gonorrhea becomes of importance when the individual concerned is promiscuous and has a negative smear. In my opinion, such a person should be treated when cultures are not available and the clinical and epidemiologic facts indicate that she is likely to be infected, even though the smears are negative.

An untreated promiscuous person infected with gonorrhea is likely to infect many others and failure to treat her with sulfathiazole would, in my opinion, be a greater error than to treat with sulfathiazole such a person who has a nonspecific infection.

CONVULSIONS OF ANESTHESIA*

By James Pearce Tye, M.D., F.A.C.S.
Albany, Georgia

Fortunately, convulsions of anesthesia are a rare complication. There are surgeons with fifteen years' or more experience who have never seen one. A search of the literature reveals no reports of this complication until 1922, when Patch[1] reported two cases of epileptiform convulsions during anesthesia. Since 1925, each year there has been an alarming increase in the number of cases reported. Ether is the anesthetic usually associated with spasms, but cases have been reported where nitrous oxide,[2] cyclopropane,[3] vinesthene,[4] or chloroform was used. These convulsions are occurring more frequently each year and many are terminating fatally. It is imperative to be on the alert for such a condition. Prompt recognition and treatment are essential if the mortality rate is to be lowered. If every convulsion of anesthesia could be anticipated and the proper agents for treatment kept at hand, no doubt very few fatalities would occur. Although about 80 per cent of the cases occur in children and young adults, the complication may occur at any age. Sepsis and hyperpyrexia are frequently concomitant with the spasms, but are not necessarily preoperative symptoms.

The convulsions may begin at any time during the anesthetic. More frequently they occur at the time when the peritoneum is being incised, sutured, or when traction is being applied upon the intra-abdominal viscera.

In the beginning there is a twitching of the muscles about the eyes which rapidly spreads to the face and neck. If it is allowed to continue, the convulsive movements spread to the arms, legs and trunk. At the same time the intensity

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of the spasm increases to alarming proportions. The pupils are dilated, the respirations are rapid, and cyanosis may or may not be present. The heart rate soon becomes rapid and if the convulsion continues for very long, the body temperature rapidly rises.

ETIOLOGY

The etiologic factor or factors are still obscure. Many theories have been advanced, most of which have been only personal opinions of the various authors. Very little research work has been done. In 1936, Rosenow and Tovell[5] reported five cases in which convulsions of anesthesia occurred. It is their opinion that the convulsions are attributable to a neurotoxin produced by certain strains of streptococci present in the patient's throat at the time of the anesthetic. Although this theory is more or less generally looked upon with disfavor, it is the only theory that has been formulated with a scientific background of bacteriologic and physiologic research. Raab,[6] in 1936, reported four cases and advanced the theory of hyperventilation. It is his opinion that hyperventilation is responsible for the alkalosis and low blood calcium which in turn is the actual causative factor in the convulsion. Lundy,[7] in 1937, reviewed the literature and listed thirty-three causes that have been advanced to explain the occurrence of these convulsions. Without listing any further etiologic factors, it is quite apparent that at the present time no one specific cause factor has been accepted.

TREATMENT

Since we have no method whereby one can predict a convulsion of anesthesia, prevention is impossible. We do know that the complication is more prone to occur under certain conditions. We should apprehend a convulsion in a child or young adult who is excited or frightened before the anesthetic is started; with any patient who is septic and has a temperature of 101° F. or over; and in patients who have been overdosed with atropine. Atropine given in overdoses causes a rise in body temperature, especially in children who are septic. There is always the possibility of using other forms of anesthesia when one is in doubt as to the advisability of using general anesthesia. In two cases I have given spinal anesthesia to children rather than give them ether.

After the convulsion has been precipitated prompt action on the part of the anesthetist and surgeon is imperative. The convulsion should be arrested in its beginning before it becomes generalized. As soon as the anesthetist notices twitching of the muscles about the face, the surgeon should be notified. All operative procedures should be immediately suspended and at the same time the patient should be given deeper anesthesia. I am convinced that deeper anesthesia is not contraindicated as has been pointed out by Payne,[8] but definitely indicated. Most of the time if this procedure is carried out, the convulsion will not become violent and after a few minutes it will cease and the operation can be completed. If the convulsion recurs when the operation is resumed or if it has a tendency to grow worse, an intravenous barbiturate should be prepared so that it can be used upon a moment's notice. Lundy,[9] in 1933, successfully treated a convulsion during anesthesia with an intravenous barbiturate. Since then it has been used by many observers with good results. The convulsion ceases abruptly usually when 5 or 6 c. c. of 2.5 per cent sodium ethyl thiobarbiturate has been given. The barbiturate so deeply anesthetizes the patient that his nervous system is not subject to stimulation sufficient to produce convulsion. During the ensuing period of anesthesia the maladjustment of the physiologic system usually corrects itself. This maladjustment may be a low blood calcium as Raab has suggested, and until proven incorrect we should by all means give calcium gluconate intravenously. When intravenous anesthesia has been given, the operation may be resumed without immediate fear if a patent airway has been established and oxygen is administered. At times it is necessary to use a mixture of oxygen and carbon dioxide so as to stimulate respiration. Artificial respiration may be necessary, particularly if an overdose of barbiturate was given. In one of our cases where only 6 c. c. of 2.5 per cent of sodium ethyl thiobarbiturate was given it was necessary to give artificial respiration for twenty minutes before the normal respirations returned.

CASE REPORTS

Case 1.—A negro boy, 18 years of age, with a diagnosis of perforated gastric ulcer, was anesthetized, using nitrous oxide oxygen-ether as an anesthetic agent. The abdomen was opened, but no pathologic condition found. All the intra-abdominal viscera were carefully inspected and a normal looking appendix was removed. His condition was considered good throughout the operation. He was returned to the ward at midnight in good condition. At 2:00 o'clock, during a rather boisterous reac-

tion, he had a severe convulsion that terminated fatally before any medical treatment could be instituted. Postmortem examination revealed no pathologic changes. Section of the brain and spinal cord showed no microscopic changes.

Case 2.—A white boy, 17 years of age, with a ruptured appendix of five days' duration, was operated upon in a desperate effort to save his life. His general condition was very poor. His pulse rate was 120 per minute, and his temperature was 102° F. His blood pressure was 90 millimeters of mercury, systolic and 50 millimeters of mercury, diastolic. It was decided that nitrous oxide oxygen-ether was the anesthetic of choice. The abdomen was opened and a large appendical abscess was drained. As the peritoneum was being grasped prior to closing, he began having a convulsion, which spread over the entire body before it was recognized. The anesthetist automatically deepened the anesthesia, but the convulsion continued for five minutes. It was noticed that with each tug upon the peritoneum in an attempt to close the abdomen, the convulsive movements were exaggerated. All operative procedures were suspended and at once the convulsion ceased. A few minutes later the abdomen was closed without any further spasm. The patient's condition was rather grave immediately following the operation. His pulse rate was 160, temperature 104° F., and he was definitely cyanotic. He was given oxygen for about an hour until he had fully reacted from the anesthesia. His postoperative course was stormy throughout. Although he died on the fifth postoperative day with general peritonitis, we do not feel that the convulsion was in any way responsible for his death.

Case 3.—A white boy, 15 years of age, was operated upon for gangrenous appendicitis. His temperature was 102° F. at the time nitrous oxide oxygen-ether was administered. As the peritoneum was being opened, he began having a convulsion. All operative procedure was suspended at once and deeper anesthesia was instituted. The convulsion never did reach the alarming stage; only a few convulsive movements of the upper extremities were noticed. After three or four minutes the convulsion ceased and the operation was completed without any further complication. His postoperative course was normal throughout. He was dismissed from the hospital in good condition on his seventh postoperative day.

Case 4.—A negro woman, 38 years of age, definitely not toxic, was operated upon for fibromyomata of the uterus. Her temperature was normal before the anesthetic was started and it was 99.6° F. after the anesthetic had ended. She had a convulsion while the peritoneum was being sutured. This convulsion was controlled by stopping all operative manipulation and by putting the patient under deeper anesthesia, nitrous oxide oxygen-ether being used. When an attempt was made to resume the operation, the convulsion recurred. At this point she was given 6 c. c. of 2.5 per cent solution of sodium ethyl thiobarbiturate intravenously. The convulsion ceased immediately and so did her respiration. Aritificial respiration was necessary for a period of twenty minutes before she breathed. Before leaving the operating room, an ampoule of calcium gluconate containing 15½ grains was given intravenously. The patient reacted from the anesthesia normally and had an uneventful postoperative course.

Case 5.—A white boy, 10 years of age, was observed for sixteen hours with pain in abdomen; leukocytosis of 23,000, with 93 per cent polymorphonuclears and a temperature ranging from 101 to 104° F. Morphine

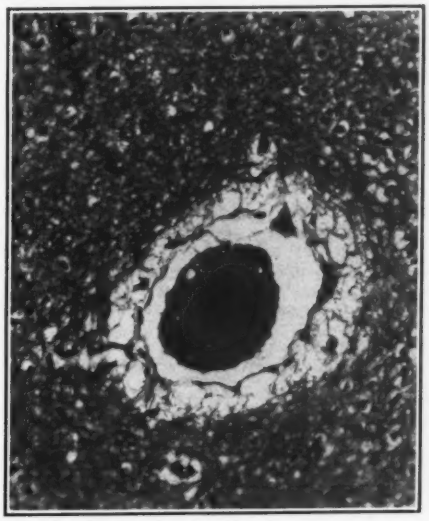

Fig. 1

Prefrontal cortex, Mag. 280 x. Dilatation of vein in subarachnoid space. Note thickening of the wall and presence of collagen and fibroblasts in subarachnoid space.

Fig. 2

Temporal cortex, Mag. 150 x. Marked disturbance of cortical architecture as result of destruction of ganglion cells and glial proliferation. Note proliferation of microglia in form of rod cells.

1/10 grain and atropine 1/400 grain were administered as a preoperative sedative and nitrous oxide oxygen-ether was used as an anesthetic. The appendix was found to be inflamed and as the stump was being inverted the anesthetist announced that he was beginning to have a convulsion. The anesthetic was discontinued, oxygen administered, and the wound speedily closed. The convulsion was controlled after fifteen minutes with sodium ethyl thiobarbiturate. It was necessary to administer oxygen carbon dioxide mixture six hours postoperatively on account of cyanosis and a heart rate of 160 per minute. The first postoperative day oxygen was given at intervals on account of minor recurring convulsive seizures. He never regained consciousness and by the seventh postoperative day he presented a typical picture of decerebrate rigidity with spasticity and contracture of the upper extremities and alternate spastic and flaccid states of the lower extremities. He remained in this state until the twenty-second postoperative day, when he developed pneumonia and died on the twenty-ninth day without ever regaining consciousness. At autopsy the brain was removed for pathologic study. The characteristic degeneration of the ganglion cells, as has been noted in anoxia, was present throughout. (*Figs. 1, 2, 3, 4* and *5*).

SUMMARY AND CONCLUSION

Five cases of convulsions of anesthesia with two deaths and three recoveries are reported. One of the patients died during the convulsion; the other patient who died lived twenty-nine days

Fig. 4

Occipital cortex, Mag. 225 x. Total loss of normal cortical lamination due to destruction of ganglion cells and reactive proliferation of neuroglia. Note presence of astrocytes of the "Gemastete Zellen" type. These cells show voluminous homogeneous cytoplasm with the nucleus at one side of the cell body.

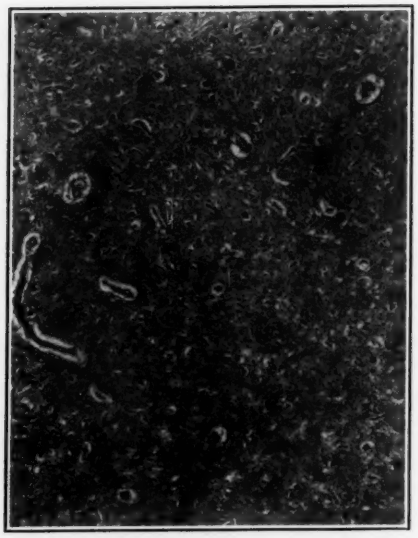

Fig. 3

Motor cortex, Mag. 200 x. Intense proliferation of astrocytic glia in the marginal layer. Loss of normal cortical lamination as result of glial replacement of ganglion cells. Note hyperplastic vessel walls and dilatation of Virchow-Robin spaces.

Fig. 5

Inferior olive, Mag. 150 x. There is marked interstitial and pericellular edema. Cells of the inferior olive are shrunken and stain homogeneously. The right upper segment shows almost complete ganglion cell loss with an increase of fixed glia.

in a state of decerebrate rigidity without ever regaining consciousness. The three patients who recovered were all given deeper anesthesia as soon as the convulsion was recognized. In one of these the convulsion recurred when the operative procedure was resumed, but was controlled with intravenous anesthesia and the operation was completed.

The etiology of convulsions of anesthesia is briefly discussed. The most logical theory to me is that of Raab: that the convulsions are due to hyperventilation tetany. The deaths that occur are the result of cerebral anoxemia caused by the convulsion which is itself secondary to hyperventilation. Death may occur immediately or after days or weeks as a result of anoxemia of the basal cell ganglia.

I believe that operative procedure should be stopped and that treatment should consist of deeper anesthesia or intravenous anesthesia at the onset of the convulsion, and that hyperventilation through use of carbon dioxide should be stopped immediately when a convulsion is recognized.

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DISCUSSION (*Abstract*)

Dr. William A. Smith, Atlanta, Ga.—Dr. Tye has presented one of the most serious neurologic complications of anesthesia and surgery. Two problems are involved which are closely interrelated: that of the convulsion *per se* and that of anoxemia. It is now recognized that neurologic disorders following anesthesia are most often due to anoxemia. Some may assume that this anoxemia is merely secondary to the respiratory arrest during convulsions. However, the serious neurologic disorders which often result are rarely seen following convulsions associated with other diseases. Similar disorders may develop without marked symptoms during administration of the anesthetic, and in such cases the anoxemia is clearly not due to the convulsions. Moreover, anoxemia is a well known cause of convulsions. This has been established on both clinical and experimental evidence.

Numerous physico-chemical disturbances may result in convulsions, and it is probable that different factors are involved in different cases. While I am not competent to offer a solution as to the cause of convulsions in anesthesia, I believe that serious consideration should be given to the factor of anoxemia.

It was my privilege to see *Case 5* with Dr. Tye, and the neurologic findings were those of decerebrate rigidity, indicating diffuse destruction of cerebral structures. The history and findings seemed characteristic of anoxemia, which was confirmed pathologically. Sections of the brain showed widespread capillary damage, severe edema, destruction and shrinkage of ganglion cells throughout the brain. As shown by Behrend and Riggs, anoxemia affects all the viscera, but since the nervous system is most susceptible the nervous symptoms predominate.

Similar cases have been reported following all types of anesthesia, nitrous oxide, ether, cyclopropane, tribromethyl alcohol, and spinal, both of very short duration and of prolonged duration. In many cases there has occurred some type of cardiorespiratory arrest with convulsions or cyanosis during anesthesia, as in this case. Iu others, nothing abnormal was noted until later, the patient failing to regain consciousness at the usual time and later developing convulsions or some type of mental disorder. Death usually occurred in a few hours or days, but some lingered in coma for several weeks. Recovery with permanent and severe neurologic defects has occurred. Undoubtedly milder disorders of this type pass unrecognized, and some so-called neurasthenic states following operation may be due to a similar process.

In a careful study of twenty-one cases, Behrend and Riggs concluded that often there is a pre-existing condition producing a relative anoxemia or circulatory deficiency. They classified these factors as anemic anoxemia, due to anemia which may be present before operation; histio-toxic anoxemia, due to toxins or overdosage with barbiturates and narcotics; stagnant anoxemia due to a circulatory defect, and anoxic anoxemia, due to insufficient supply of oxygen.

Orr also has recently emphasized the importance in surgery of measures to prevent anoxemia, particularly the prevention of shock and hemorrhage and the avoidance of large doses of barbiturates and other toxic drugs. Cooperative studies by the surgeon and the anesthetist would seem essential for the solution of this problem.

Dr. Tye (closing).—Surgeons who depend upon a nurse anesthetist have to take this responsibility upon their shoulders. Those surgeons who have an expert anesthetist like Lundy or Woodridge certainly do not feel the responsibility as we do.

I believe that most convulsions during anesthesia can be controlled by first stopping all operative procedure and by giving deeper anesthesia. In the meantime if these procedures fail to control the convulsion, sodium ethyl thiobarbiturate should be given intravenously.

EXOPHTHALMIC OPHTHALMOPLEGIA*

By Ray K. Daily, M.D., F.A.C.S.
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Exophthalmic ophthalmoplegia is the title proposed by W. R. Brain[1] in 1938, for a syndrome consisting of progressive bilateral exophthalmos and ophthalmoplegia, followed by secondary visual disturbances. He believes that this syndrome is a separate disease entity, which may or may not be associated with disturbances of thyroid function. In 1932, Friedenwald[3] in reporting a fatal case of this type in which the ocular syndrome preceded by several months the onset of hyperthyroidism, suggested that the ocular disturbance may represent a separate disease entity. This disorder may appear with a normal or subnormal metabolic rate from ten days to two years following a subtotal thyroidectomy, or it may develop spontaneously without any symptoms of thyrotoxicosis. For a detailed study of the syndrome in spontaneous cases we refer the reader to Brain's[1] original article, in which he reports thirty-one cases, twenty-nine of which were spontaneous. Heretofore the post-thyroidectomy cases have been reported under the title of "malignant exophthalmos", or "progressive exophthalmos" by Ruedemann,[16] Naffziger,[13] Zimmerman,[27] and Thomas and Woods.[23] There appears to be no difference in the clinical course or pathologic findings of the post-thyroidectomy or spontaneous cases.

This clinical entity is to be differentiated from exophthalmic goiter, thyrotoxic myopathies, and myasthenia gravis. It differs from exophthalmic goiter in not being associated with disturbances of the central nervous system or general symptoms of thyrotoxicosis, and in the age and sex incidence. Exophthalmic goiter is a disease of early adult life, and is most common in women, while exophthalmic ophthalmoplegia occurs most frequently in middle life and the proportion of males is much higher than that in exophthalmic goiter.

The thyrotoxic myopathies which are caused by a reparable disturbance in the phosphocreatine metabolism[18] involve muscles of the body in addition to those of the eye, and recovery from thyrotoxicosis is followed by complete recovery from the myopathy. Complete recovery from this syndrome is rare.

Myasthenia gravis complicating exophthalmic goiter has a clinical course entirely different from that of exophthalmic ophthalmoplegia, and is characterized by ptosis which is rare in this syndrome. In addition, the two are easily differentiated by their response to an injection of prostigmin[4] which in myasthenia gravis temporarily abolishes the ophthalmoplegia while in exophthalmic ophthalmoplegia it has no effect.

Clinically the patient comes complaining of a progressive protrusion of the eyeballs, diplopia, lacrimation, and pain in the eyes. In the three cases which we have seen, the complaint of diplopia was relatively mild, in comparison with the usual annoyance of diplopia caused by innervational muscle paresis. The patient has no symptoms referable to other parts of the body, and the disturbance appears at the outset to be limited to the eyes. The most striking feature is a bilateral, asymmetrical exophthalmos, the disturbance involving one eye in advance of the other unilateral and symmetrical exophthalmos, have occurred. The degree of exophthalmos is much greater than that seen in exophthalmic goiter; in most cases it is straight ahead, and the firm resistance felt on pushing the eyeball backwards is suggestive of a retrobulbar tumor. Some cases have been operated upon with this diagnosis. The ophthalmoplegia, unilateral or bilateral, is generally proportional to the exophthalmos and may be a paralysis or a paresis; its characteristic feature is the disturbance of motion in a particular plane, rather than the involvement of a single muscle or group of muscles with a common innervation; for example, elevation or abduction may be paralyzed. In addition to the ophthalmoplegia and exophthalmos, edema of the lids and chemosis of the bulbar conjunctiva are prominent symptoms. The exophthalmos and ophthalmoplegia increase for several months, and then may remain stationary or partially recede, to some extent remaining permanently. The course is similar in post-thyroidectomy cases, in which the thyrotoxic phenomena subside while the exophthalmos, after a period of quiescence, increases rapidly, and ophthalmoplegia and chemosis appear.

While the patient's first complaint is that of protrusion of the eyeballs, the chief menace of

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the affection is its threat to vision, which may be lost through corneal or optic nerve destruction. The exophthalmos interferes with the closure of the lids, and the chemosis of the bulbar conjunctiva may become so great that the swollen conjunctiva protrudes between the lids and keeps them farther apart. The cornea, deprived of its physiologic protection, develops a lagophthalmic keratitis, and the corneal epithelium dries, desquamates, and leaves erosions, which may be followed by ulceration, perforation, and loss of the eye. Thompson[24] believes that the low grade superficial keratitis may also be caused by an interference with the circulation at the apex of the orbit and circulatory stasis. Papilledema[13] resulting in blindness has been reported in a number of cases following thyroidectomy. Pletneva[15] reported a case of optic atrophy caused by stretching, and one eye in one of our own cases manifested an optic atrophy six months after the onset of the disease. Joiris[6] reports a case of retrobulbar neuritis associated with this syndrome. Among the subjective symptoms are an annoying lacrimation, and pain in the eyes which is difficult to relieve.

There are no significant constitutional symptoms. The general examination is essentially negative, and the basal metabolic rate seems to have no relation to the course of this syndrome. The patient's placid attitude and apparent lack of anxiety in the face of an obviously serious affection is somewhat puzzling; particularly so in comparison with the emotional disorganization commonly seen in patients with exophthalmic goiter.

The etiology of this syndrome is as obscure as that of exophthalmic goiter. A review of the enormous amount of clinical and experimental research material on the mechanism and etiology of exophthalmos in exophthalmic goiter is not within the scope of this paper. The experimental data to date vindicate thyroxin as the primary cause of exophthalmos, although Labbe[8] and his co-workers believe that they have demonstrated that thyroxin sensitizes the sympathetic nerve-endings, the stimulation of which causes the exophthalmos. There is evidence to indict, but not entirely convict the thyrotropic hormone of the pituitary[9] or at least some interference with its metabolism.[10] Stallard[20] reported a case of exophthalmic ophthalmoplegia, in which the administration of thyrotropic hormone increased the exophthalmos. The clinical course of the disease, the consensual effect of surgery seen in some cases[1] and the mechanism of these phenomena,[25] the unique physiologic behavior and sympathetic innervation of the extraocular muscles,[26] the structure of the smooth periorbital muscle,[2] and the close innervational association of the motor and sensory apparatus of the eyeball with the sympathetic nervous system,[21] all are suggestive of a neurovegetative disturbance. The ancient observations of eyes popping out in fright, and of inability "to see straight" in anger, may lead one with an interest in psychogenic disturbances far afield from the task of the ophthalmologist, and the immediate problem of saving vision. Since it has been demonstrated that emotional processes may through the medium of the sympathetic system produce organic changes it appears probable that exophthalmic ophthalmoplegia belongs to the category of neurovegetative disturbances, the exact nature of which is not as yet clearly understood. The edema of the orbital tissues, and the pronounced venous congestion appear analogous to the process taking place within the eyeball in congestive glaucoma.

Inman[5] demonstrated the relation of the emotions to acute glaucomatous attacks. Both exophthalmic ophthalmoplegia and glaucoma appear to have as their goal the destruction of sight. Why in one case the pathologic process attacks the eyeball directly, and in the other indirectly through the orbital tissues may perhaps be explained by a difference in the underlying emotional situations.

Because the pathology in the orbit in post-thyroidectomy exophthalmos,[13] in exophthalmic ophthalmoplegia,[1] and in experimental exophthalmos[19] is similar, one may venture the assumption that the pathogenesis is also the same. On the basis of experimental data Smelser[19] concludes that the exophthalmos is caused mechanically by the excess of orbital tissue. The clinical recession of the eyeball following orbital decompression would support Smelser's view. Brain[1] believes that the exophthalmos and ophthalmoplegia are caused at first mechanically by the rapid rise of tension within the retrobulbar muscle cone. The increased retrobulbar tension also causes a compression of the superior and inferior ophthalmic veins with consequent peripheral engorgement and edema. The edema further augments the tension increasing the exophthalmos and ophthalmoplegia. A vicious cycle is thus produced, by which Brain explains the intensity and rapidity of the development of this syndrome. That the ophthalmoplegia is not always concurrent with the exophthalmos is indicated by two

recent case reports. In McGregor's[12] case the ophthalmoplegia preceded a slowly developing exophthalmos, and Martin[11] and Pennell reported a case with moderate thyrotoxicosis and ophthalmoplegia, and only a slight exophthalmos.

The anatomically demonstrable pathologic condition appears to be confined to the orbital tissues, and consists grossly of edema of the orbital fat and enlargement of the extraocular muscles. Microscopically there is serous exudate, perivascular and nodular round cell infiltration, hyalinization and destruction of muscle fibers. In a case, in which exophthalmic ophthalmoplegia was present for six years, the extraocular muscles were found transformed into fibrous bands. Most of the pathologic material examined came from post-thyroidectomy cases. Of the spontaneous cases only a few have been examined histologically.

Because the symptoms are limited to the eye, the patient usually consults the ophthalmologist first, and because the chief menace of the disease is to vision, it is finally the task of the ophthalmologist to save the eyeball. Medical therapy so far has been entirely ineffective. Conservative surgical procedures such as canthotomy, tarsorrhaphy, and removal of the orbital fat have also been futile; and prior to Naffziger's work, the prognosis for these cases was extremely grave. In 1932 Naffziger[14] devised the transcranial decompression of the orbit, giving the swollen orbital tissues space for expansion in the anterior cranial fossa. He reported the first encouraging results in what were until then considered hopeless cases. In 1934, Swift[21] found a modified Kronlein operation effective for a case diagnosed as orbital tumor. There was no tumor found at operation but the exophthalmos receded because the enlarged orbital contents expanded towards the temporal muscle. In 1936, Sewell[17] proposed utilizing the parasinous nasal spaces for the expansion of the orbital tissue, and in 1937, Kistner reported two cases successfully handled in this manner.

The following three cases are reported because of their clinical interest, and in order to augment the as yet limited pathologic material on record.

Case 1.—P. R., aged 32, white, Mexican, was a restaurant dishwasher by occupation. We saw him first September 12, 1939, at the Eye Clinic of the Jefferson Davis Hospital, with the complaint of pain in the eyes. The tremendous bilateral exophthalmos and ophthalmoplegia made it obvious that this was a very unusual case. The family and previous histories were negative. In January, 1938, he was a patient in the hospital for one day for an abdominal stab wound, which he sustained in a fight while intoxicated. The present illness began with proptosis in December, 1938, after a period of heavy drinking. He was an in-patient at the hospital on the surgical service during April and May of 1939, during which time a very exhaustive study of the case was made, with consultations of the neurologic, rhinologic, medical, ophthalmologic, x-ray and laboratory services. Outside of the progressive exophthalmos, the reports were negative. Blood cholesterol was high, 217 mg. Blood pressure was higher than normal; it is recorded as 165/95 on admission and 142/76 after five weeks in bed. The exophthalmos during that period is recorded as 28 in the right eye and 26 in the left. Corrected vision was 20/30 in each eye. He left the hospital at his own request in June, 1939. About September 5, he was struck on the head in a hold-up; after that the right eye became very painful, and he came to the eye clinic on September 12. At this time he presented a picture of a very pronounced bilateral exophthalmos greater on the right, with marked chemosis of the bulbar conjunctiva, which projected like a sausage around the limbus, and a marked restriction of ocular motility, practically complete in the depressors. There was a definite exposure keratitis on the right cornea, and a small erosion on the left (*Fig. 1*). He was admitted to the hospital, and a blepharorrhaphy with multiple conjunctival punctures was done on both eyes. Because of the excessive tension on the right lids the blepharorrhaphy gave way. The keratitis was progressing and perforation of the eyeball was threatening. On September 22, 1939, Dr. Henry Peterson did a Naffziger operation on the right orbit.

The Naffziger operation approaches the orbit from above through an incision behind the hairline, from the temporal fossa on one side across the frontoparietal region to the temporal fossa on the other side. The scalp is reflected forward so that the entire frontal bone

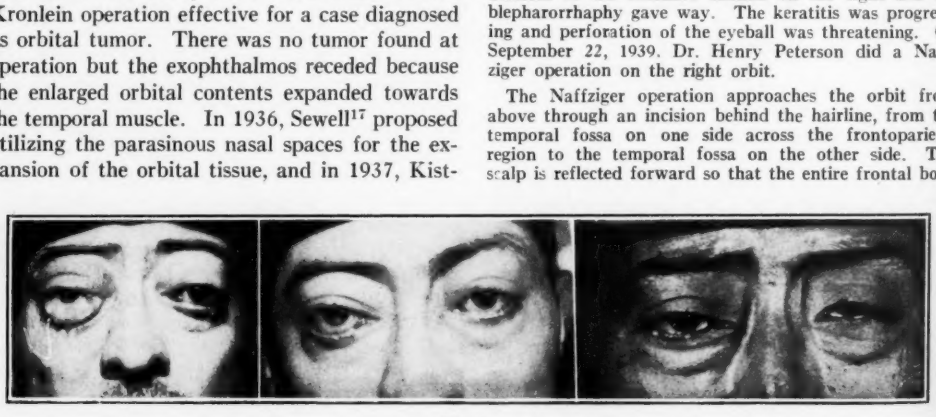

Fig. 1

P. R., *Case 1.* The photograph on the left was taken on September 12, 1939; that in the middle, six months after a Naffziger decompression on the right orbit and an intrasinus decompression on the left orbit; the one on the right was taken one and one-half years later.

on both sides is exposed, down to the frontal sinus. Bilateral frontal flaps are then turned down, the hinge of each being the temporal muscle. A small bridge of bone is left between the two bone flaps. The dura on the under surface of the frontal lobe is bluntly stripped off the roof of the orbit. This stripping is carried back to the sphenoidal ridge and the base of the anterior clinoid, mesially nearly to the cribriform plate. The roof of the orbit is then opened and carried forward to the frontal sinus, laterally to the point where the roof of the orbit merges into the lateral wall of the skull. Posteriorly it is carried to the sphenoidal ridge. The roof of the optic foramen to the supero-lateral margin are removed. The orbital fascia is then incised as likewise the ring of Zinn.

As the right orbit was unroofed and the orbital periosteum was incised the retrobulbar tissues bulged up into the cranium. A piece of the rectus externus, which was thick and edematous was excised for examination. The eyeball receded immediately and the lids were easily resutured. After the postoperative reaction subsided, the cornea gradually healed and the patient was discharged from the hospital on November 22, 1939, with the right cornea healed, with some iritic synechia, and the left lids held partially together by the blepharorrhaphy. He re-entered the hospital December 13, 1939, complaining of pain in the left eye. The left cornea had a superficial erosion, and the exophthalmos was still marked. It was decided to decompress the left orbit, and on December 14, Dr. Louis Daily did a decompression into the sinuses under local anesthesia. The skin, anterior and posterior ethmoidal nerves, and the supra and infraorbital nerves were injected with procaine hydrochloride. The usual curved skin incision for an external frontal sinus operation was made. The floor of the frontal sinus was removed and the mucous membrane of the sinus completely exenterated. The supraorbital ridge was removed 1.5 cm. upwards, to the limit of the sinus laterally, and to its end medially; the nasal process of the frontal bone was removed next; then the lacrimal bone, taking care to avoid injury to the lacrimal sac. The lamina papyracea was removed in its entirety, and the ethmoid labyrinth was thoroughly exenterated as far back as the sphenoid sinus (*Fig. 2*). The inferior margin of the paper plate joins the ridge formed by the bed of the ethmoid below and the floor of the orbit medially. Removal of bone beyond the lower margin of the paper plate opens the antrum. The posterior border of the paper plate joins the ridge formed by the bed of the ethmoid behind and the floor of the orbit laterally and marks the limit of safety. Removal of bone beyond this will open the sphenoid, and may injure the optic nerve, because the optic foramen lies 4-6 mm. laterally from the upper margin of the paper plate. The removal of the supraorbital ridge permits the contents of the orbit to expand against the roof of the frontal sinus and to obliterate it. One need not fear that the skin over the removed ridge will retract, because the abundance of orbital tissue easily fills in the space. In this case the maxillary space was not utilized, as suggested by Sewell; and his mucoperiosteal flap for closure of the fronto-nasal opening was not made because of a marked deviation of the nasal septum. During the two years following this operation the patient was kept under observation. The lack of the mucoperiosteal flap, so far, has not caused any untoward symptoms, and it appears that its need has not been demonstrated.

On opening the periorbital fascia and Tenon's capsule the retrobulbar tissue was found engorged. The superior rectus was edematous, enlarged, and pale. The wound was closed without drainage. The eyeball receded immediately, but the next day the postoperative reaction caused proptosis again. Within a week the postoperative reaction subsided and the eyeball receded, making the blepharorrhaphy unnecessary. The sutures were removed one week after the operation. Two weeks subsequently the lower portion of the wound was opened to evacuate a collection of serum, which drained for a week. The cornea healed promptly upon the recession of the eyeball. He left the hospital on the eleventh day. Seen in January, 1940, he could close both eyes but the ocular motility was restricted in all directions; he could not depress the eyeballs, and the left externus was paralyzed. He had an opacity on the lower third of both corneae and vision was corrected to 20/50 in the right eye and 20/30 in the left. He has resumed his occupation and gets along very well.

In March, 1941, the completely paralyzed left externus was exposed, and found fibrous, thin, and tense. In innervational muscle paresis the muscle is usually flaccid and stretches easily. This muscle was tense and rigid. Seen in October, 1941, the exophthalmos measured 20 mm. on the right, and 18 mm. on the left. Vision and ocular motility were the same (*Fig. 1*).

The microscopic picture of the conjunctiva was characterized by edema, congestion, and cellular infiltration. The cells in the conjunctiva consisted of small mononuclear cells, a few macrophages and a number of eosinophils. The cells accumulated in masses and manifested a definite tendency to form lymphatic nodules and aggregations around the vessels. The muscle fibers

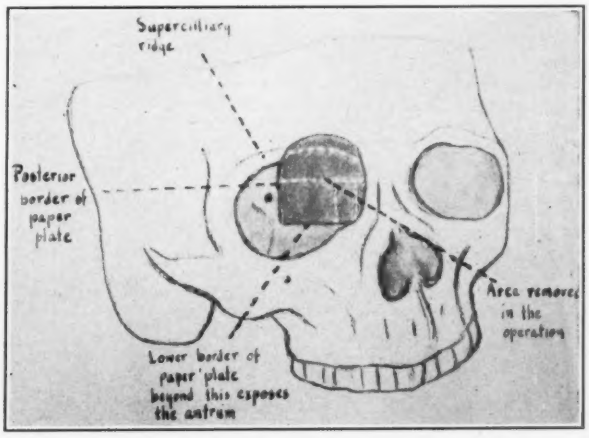
Supercilliary ridge
Posterior border of paper plate
Area removed in the operation
Lower border of paper plate beyond this exposes the antrum

Fig. 2

Diagrammatic representation of the extent of bone removed in the intrasinus decompression of the orbit.

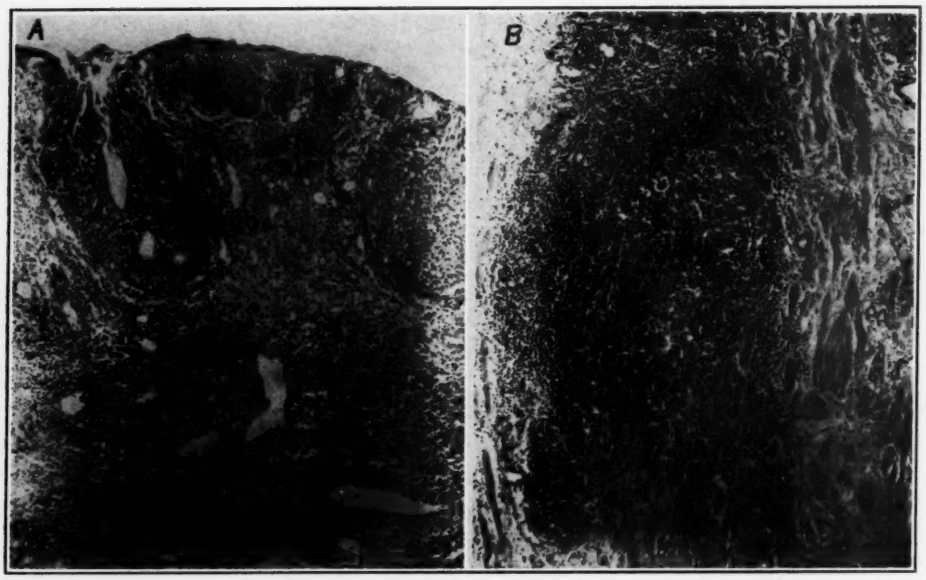

Fig. 3

Photomicrographs from *Case* 1. (A) conjuctiva, (B) muscle. Both sections show intense edema and cellular infiltration (Army Medical Museum Neg. 72434 and 72433.)

were necrotic; the infiltration between the muscle fibers consisted of lymphocytes, epithelioid cells, a few eosinophils, and an occasional foreign body giant cell (*Fig. 3*).

This was a case of exophthalmic ophthalmoplegia in which the eyeballs and vision were saved by orbital decompression transcranial on one side, and intrasinus on the other. The results appear to be equally satisfactory.

Case 2.—E. E. W., a white man, aged 40, on September 30, 1940, came complaining of exophthalmos of the right eye and diplopia of two months duration. He was annoyed by profuse lacrimation, and pain in the right eye, which was so severe that it kept him awake during the night. He presented a picture of marked right sided exophthalmos with a slight degree of ptosis. The eyeball was displaced down and out (*Fig. 4*). The first glance at the patient aroused suspicion of a retrobulbar tumor. The bilateral ophthalmoplegia, however, was a clue to the correct diagnosis. Movement upwards was entirely abolished, indicating loss of function in both superior recti and inferior obliques. The right eyeball had no adduction. There was a marked dilatation of the ciliary veins at the outer canthi. The right exophthalmos measured 24 mm., and the left 18, showing that exophthalmos was beginning in the left eye, although at first glance this was not apparent. Vision was corrected to 20/20 in each eye and corneal haziness was present in the lower third of the right cornea.

He was referred to Dr. Peterson, for a general examination, who made the diagnosis of hyperthyroidism and did a subtotal thyroidectomy on October 19, 1940. The microscopic picture of the removed thyroid was that of primary hyperplasia of the thyroid gland, and the diagnosis of hyperthyroidism was thus confirmed anatomically. The patient made an uneventful recovery and left the hospital on the sixth day. The exophthalmos, however, continued to progress and the left eye, too, became definitely proptosed.

Fig. 4

E. E. W., *Case 2*. The photograph on the left was taken on September 30, 1940. That on the right September 15, 1941, one year after an intrasinus decompression of the right orbit.

One month after the thyroidectomy the exophthalmos was 28 mm. for the right eye and 22 mm. for the left. Vision in the right eye fell to 20/200, and a low grade but rapidly progressive keratitis was involving the lower half of the cornea. It was decided to decompress the right orbit, which was done by Dr. Louis Daily, December 5, 1940, by exenteration of the superior and medial orbital walls, in the manner described in the previous case.

The frontal sinus was very small, and it was obvious that there was not as much room for tissue expansion as might be desired. On opening the orbital fascia the retrobulbar tissue herniated out. The rectus internus was found immensely hypertrophied, edematous, and thick. The patient made a rapid recovery and left the hospital on the fifth day. The right eyeball receded sufficiently for the lids to close, but on the whole the exophthalmos receded very slowly. The keratitis was slowly cleared up, leaving an opacity in the lower portion of the cornea. Six weeks after the decompression the exophthalmos of the right eye was less than that of the left. He continued, however, to complain of pain, which could not be accounted for by the extent of the corneal involvement. It might have been due to pressure on the ciliary nerves. He was not seen again for 8 months, when he said that he had consulted another ophthalmologist, who gave him a typhoid injection and relieved the pain. When last seen in September, 1941, the exophthalmos was 21 mm. for the right eye and 25 for the left. Vision in the right eye was 20/200 and 20/20 in the left. The elevators were paretic; depression was slightly restricted; horizontal motion was good with the exception of the right externus which was paretic. He gained considerable weight, and was at work in his gasoline station (*Fig. 4*).

The microscopic picture of a section of the rectus internus was that of intense congestion, edema, necrosis of muscle fibers, diffuse infiltration with round cells, and definite formation of lymphatic nodules with germinal centers between the muscle fibers (*Fig. 5*).

This was a case of exophthalmic ophthalmoplegia in which the course of this syndrome was apparently unaffected by its association with hyperthyroidism. The slow recession of the exophthalmos caused a visual loss, which might have been avoided had decompression been more extensive.

Case 3.—H. S., aged 61, a colored Baptist minister, came to the eye clinic of Jefferson Davis Hospital on May 10, 1941, complaining of bulging of the eyeballs and pain in the eyes, which began one month previously. He attributed it to getting rat poison into his eyes, while working on a chicken house. The family and previous history and the general examination were negative. The metabolic rate was minus 10.

The ocular condition was one of extreme bilateral exophthalmos, complete immobility of the eyeballs, and intense conjunctival chemosis. The lids were swollen and the upper lids retracted. The conjunctival surface was blue and desiccated and bled easily; the corneae had a low-grade superficial keratitis. Vision was light perception in the right eye and 20/200 in the left. Multiple conjunctival punctures had no effect on the conjunctival chemosis. While he was in the hospital, having various examinations, the conjunctival chemosis increased so that the conjunctival mass covered the right cornea almost completely (*Fig. 6*). In spite of the conjunctival protection, the keratitis progressed. It is quite certain that this was not an exposure keratitis, because the cornea was covered by the chemotic conjunctiva. The nutrition of the cornea was disturbed. The x-ray examination showed an absence of the right frontal sinus, and a small sinus on the left. On May 30, 1941, an intrasinus orbital decompression was done by Dr. Louis Daily on the left side, with the intention of doing a Naffziger on the right. In this case the roof of the maxillary sinus was removed as far laterally as the infraorbital nerve in order to provide adequate space for the engorged orbital tissue. On incision of the orbital fascia the tremendous venous congestion was striking; bleeding was so profuse that suction had to be used constantly to permit inspection of the orbital tissues. The appearance of the internus was very peculiar; the tendon for five or six mm. from the eyeball was not changed significantly; but the muscle bellies were tremendously thickened, and indurated so that they appeared as dense, white, rigid masses getting thicker and denser towards the apex of the orbit. A piece

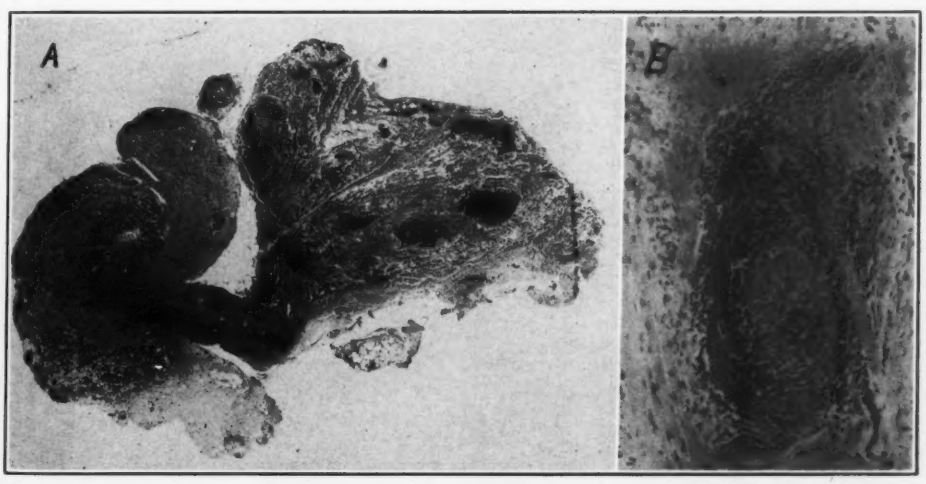

Fig. 5

(A) Section of rectus internus from *Case 2*, showing intramuscular infiltration and venous engorgement of Tenon's capsule. (B) High power of section showing lymph follicle with germinal center. (Army Medical Museum Neg. 72432 and 72441.)

Fig. 6

H. S., *Case 3*. The photograph on the left was taken on May 10, 1941; that on the right on August 25, 1941, after an intrasinus decompression of the left orbit.

of muscle excised for examination had the gross appearance of a pale, dense, structureless mass. Following the decompression the left eyeball promptly receded, and the upper lid, which became paretic, came down over the cornea and covered it. On June 16, 17 days after the operation, the right eyeball showed signs of spontaneous recession, and both corneae were cleared up.

Brain[1] reports a similar case in which both eyes receded after a decompression of one eye. The mechanism of consensual ocular reactions has been the subject of some interesting studies,[16] which make it appear that they are produced through the medium of the sympathetic system. The patient left the hospital 3 weeks after the operation and was not seen again until October, 1941, when the exophthalmos measured 28 mm. in the right eye, and 20 mm. in the left. All motion was restricted, and motion down and to the left was completely abolished. There was partial ptosis in the left eye, probably caused by postoperative adhesions. The left eyeball was on a lower level than the right. Apparently, removing the floor of the orbit caused a displacement of the eyeball downwards. While the experience with one case does not justify conclusions, we are inclined to the view that removing the floor of the orbit should be avoided (*Fig. 6*). The right pupil was dilated and rigid. There was no light perception, and the disk was atrophic and pale. The left eye had vision corrected to 20/40, and the fundus was normal.

To determine whether the damage to the optic nerve was reparable, a Naffziger operation was performed on the right eye October 16, 1941. The retro-orbital tissues were found under tremendous tension, and upon incision of the orbital fascia the fat bulged out of the wound. The optic nerve was found taut and stretched. To date there has been no return of light perception.

The microscopic picture of the retrobulbar tissues was characterized by edema and venous engorgement. The conjunctiva was edematous and diffusely infiltrated with plasma cells and lymphocytes. The infiltration was particularly dense around the vessels, and in places showed a tendency to form circumscribed nodules. The same type of infiltration was seen in the orbital fat. The muscle fibers were hyalinized, and degenerated in patches; they appeared embedded in masses of round cells, which formed nodules in places (*Fig. 7*).

The rapid loss of vision in the right eye indicated early damage to the optic nerve. The final result was a total loss of vision on the eye which was not operated upon, and return of good vision on the decompressed side. The right orbit should also have been decompressed immediately; the occurrence of spontaneous recession of the right eyeball following the decompression on the left misled us. We thought that the eyeball would continue to recede and operation would be unnecessary. Much to our chagrin the patient returned with complete optic atrophy.

CONCLUSIONS

(1) Exophthalmic ophthalmoplegia, a syndrome characterized by exophthalmos and ophthalmoplegia, may occur independently of or concurrent with hyperthyroidism.

(2) The edema and venous engorgement suggest a pathogenesis similar to that of acute inflammatory glaucoma.

(3) It appears to be a self-limited disease, which during its acme may destroy vision through corneal or optic nerve involvement.

(4) Adequate decompression of the orbit re-

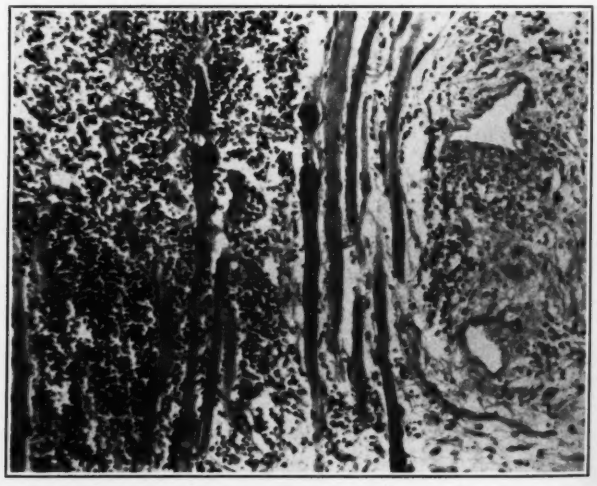

Fig 7

Section of rectus internus from *Case 3;* it shows edema and destruction of muscle fibers, and intramuscular and perivascular infiltration. (Army Medical Museum Neg. 74250.)

gardless of the method used reduces the exophthalmos, and arrests destruction of vision.

(5) In cases with large frontal sinuses, the rhinologist can provide adequate decompression into the paranasal sinuses by removing the superior and medial orbital walls. This operation performed under local anesthesia is a less formidable procedure, and is followed by a more rapid postoperative recovery than a transcranial decompression.

(6) In cases with small frontal sinuses the Naffziger transcranial decompression gives a more effective immediate result.

(7) Three cases are reported, two spontaneous and one in association with hyperthyroidism.

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DISCUSSION (*Abstract*)

Dr. Wm. H. Luedde, St. Louis, Mo.—Speculation may be permitted as to the precise mechanism by which edema of the orbit is produced, but clinical symptoms as well as the pathologic changes in all orbital contents, muscles and connective tissue may be regarded as the logical consequence of an edematous hypertension within the bony walls of the orbit. That these changes are not perfectly symmetrical indicates that anatomical variations within each orbit may determine the difference in minor details. The possible influence of impulses derived from the sympathetic nervous system cannot be denied. However, edema is always the product of changes in capillary permeability associated more or less with modification of the osmotic index of the blood plasma. Thus edema may result directly from trauma or from the production of histamine or allergy or from the presence of certain other substances in the blood.

Indeed, in one of our post-thyroidectomy cases it appeared that medical care directed toward the control of allergy was definitely helpful. Hence, it may be well not to eliminate entirely medical study and treatment of these cases.

The mention of high blood cholesterol in one of Dr. Daily's patients recalls researches recently reported by W. J. Griffith, of the Department of Biochemistry, and G. O. Broun, of the Department of Medicine, at St. Louis University, on the medical use of choline to correct faulty nutrition and to reduce blood cholesterol with apparent benefit in general hypertension. Broun's observations upon the general condition of the patient were apparently confirmed by improvement in vision in retinal arteriosclerosis and more rapid absorption of retinal hemorrhages.

It might be worth trying similar medication in early cases of exophthalmos in an attempt to lessen orbital edema. Opportunities to make such a trial have not presented themselves nor has it come to my knowledge that anyone has used Duggan's suggestion of capillary dilatation by sodium nitrate or erythrol tetranitrate in such cases.

When the progressive exophthalmos brings threats of damage to vision and ocular integrity prompt surgical relief must be given. In that respect the success of Dr. Louis Daily in producing efficient orbital decompression without invading the cranial cavity deserves further trial and naturally recommends itself to favorable consideration of our rhinologic confreres. It may not be amiss to emphasize the importance of direct measurements of the exophthalmos. The simple transparent exophthalmometer devised in St. Louis several years ago and marketed by Meyrowitz presents a handy and relatively inexpensive instrument for this purpose.

Dr. Joseph D. Heitger, Louisville, Ky.—In Dr. Sewell's paper, in 1926, he described along with his external operation the possibility of using a type of decompression on the optic nerve. That was published in 1926, and Dr. Daily finds it and uses it very successfully.

When Dr. Sewell, who is now retired from medical work, reads this, I am sure it will be a great satisfaction to him.

Dr. W. Likely Simpson, Memphis, Tenn.—I saw Dr. Daily operating upon one of these patients, and in the last three weeks I have done a similar case. The feature which Dr. Daily mentioned, that there should be a large frontal and a large ethmoid, if possible, was not present in my case. We did have a large ethmoid, but not a frontal. The case is too early to say what the final result will be, but I will report later.

I think it is very important to remember that we ought to remove all the mucous membrane from the frontal and ethmoids, and we need not expect that the orbital tissue will prolapse into the frontal and ethmoid without slitting the periosteum of the frontal and ethmoid region. That is just as important as the bone work.

SURGICAL TREATMENT OF GLAUCOMA*

By M. Elliott Randolph, M.D.

and

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For the past seven years at the Wilmer Institute we have been almost routinely performing an iris inclusion operation for chronic primary glaucoma. During the years preceding 1934 the trephine was, with rare exception, the operation of choice. Inasmuch as nearly an equal number of each has been done since the Institute started, this paper was written to compare our results with each type of operation. To evaluate the two types of operations more satisfactorily, the cases were divided into two groups: early and late glaucoma.

In order to collect a sizable number of cases worthy of analysis, the records of the cases in the Glaucoma Clinic were carefully searched. In this clinic, which has been operating since 1934, we have been able to follow a total of 402 patients representing 605 cases of all types of glaucoma (*Table 1*). The group of secondary glaucomas is rather small, for during the course of collecting these figures we decided that a survey of secondary glaucoma was completely valueless; therefore, we stopped including them as a special group in the Glaucoma Clinic. Cases of glaucoma in negroes comprise 34.4 per cent of the total, thus roughly, one out of every three. This is not surprising when we consider that this clinic is situated in one of the largest negro districts in Baltimore, which has the fourth largest colored population in the country.

Operative Procedures.—Since 1934, when we started doing iris inclusions on our cases of primary chronic glaucoma, we were influenced by several factors: first, during the previous year we had two unfortunate late trephine bleb infections; secondly, as the iris inclusion operations were beginning to be generally used, we began to do them merely to experiment with a new procedure. We were immediately impressed by the extreme ease with which the operation could be performed. Up to the fall of 1940, on the public ward, we were still doing more inclusions than trephines, to the extent of about four to one. We have no hard and fast rule, except possibly the depth of the anterior chamber, nearly always preferring the iris inclusion in an eye with a shallow chamber. However, we have no hesitancy in doing it in any type of chamber.

With the iris inclusion we prefer to dissect a large flap down to but not on the limbus. It is important to make the keratome incision at least 2 mm. behind the limbus. The iris is grasped, withdrawn and incised vertically, its pillars are spread apart, and the flap is closed. We have not found it necessary to evert the pillars. The eye is dressed with atropine. This can be stopped as soon as the eye whitens. Massage should be started when the anterior cham-

GLAUCOMA CLINIC

Total number of patients 402

Type of Glaucoma	Number of Cases	
	White	Colored
Acute congestive	24	2
Chronic non-congestive	120	62
Chronic congestive	153	85
Secondary (all types)	68	24
Buphthalmos	10	2
Absolute	20	35
Total	395	210
Total number of cases	605	

Table 1

*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Thirty-Fifth Annual Meeting, St. Louis, Missouri, November 10-13, 1941.

*From the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital.

ber reforms, never before. It should be continued for several months postoperatively.

We have noticed that the anterior chamber has a tendency not to reform for an average of about three days. If a bleb is present which is obviously filtering, there is no cause for alarm. Indeed we have seen an unreformed anterior chamber for as long as 7-9 days. In those cases it usually means a combined detachment of the choroid, which delays, but by no means alters, the eventual outcome. When dealing with an absent anterior chamber and an elevation of tension, the situation is extremely precarious, and we advise the immediate injection of air into the anterior chamber. This can be done by making a small incision part way in the cornea with a cataract or discission knife. A hypodermic needle is then inserted into the anterior chamber and a bubble of air forced in. This method has been notably successful in several cases which we feel would certainly have resulted in otherwise grave complications. Occasionally, we have noticed at first dressing or indeed immediately after finishing the operation, that a pillar has slipped back. This is usually due to too strong miosis preceding operation, and can be prevented by instilling a drop of atropine in the eye just before operation.

Our usual technic in a trephine is the dissection of a large conjunctival flap, carrying the dissection well down on the cornea and splitting the layers, thus placing the trephine opening half in the cornea and half in the sclera. A peripheral iridectomy seems to be all that is necessary. The flap is closed and the eye dressed with atropine. At one time, in order to give added protection of the overlying conjunctiva of the flap, Dr. Wilmer inserted a Tenon's capsule graft over the trephine opening. Later observation of these patients showed a tendency of the graft to plug the trephine opening, with the return of tension. Consequently, this procedure was abandoned. As far as postoperative complications with trephines are concerned, anterior chamber hemorrhage, when it occurs, is by no means a serious complication. The absorption behaves pretty much like any other postoperative anterior chamber hemorrhage. Delayed reformation of the anterior chamber is rare, and when present usually suggests detachment of the choroid. This seems to occur more frequently in those cases in which the trephine opening is placed too far posteriorly. It invariably goes back in place. Low grade postoperative iritis occurs no more frequently than after any other type of intra-ocular operation. At first dressing, on a few occasions, we have noticed a piece of iris caught in the trephine opening. The immediate instillation of eserine may be sufficient to pull it away. Obviously the bugbear of all trephine operations is the late infection of the bleb. However, of 159 trephines in the files of the Glaucoma Clinic we have but one case in which the eye was lost.

The cases in this analysis are cases of chronic primary glaucoma both of the congestive and non-congestive types. On each eye either a trephine or an iris inclusion operation has been performed. With the exception of six cases which were iridotases, that is, the simple incarceration of the sphincter, iridencleises were done. All of the patients were admitted to the public ward from the dispensary. The vision, visual fields, both peripheral and central, and tonometric measurements were done before operation. Operation was performed usually by the resident or first assistant, or in the case of many trephines done before 1934, by Dr. Wilmer. After operation and discharge, these same examinations were made at frequent intervals in the dispensary. After the Glaucoma Clinic was started in 1934, many cases were studied before and after operation with the gonioscope. In all, it has been possible to study these cases for an average of about five years, and some cases, particularly in the trephine group, for fifteen years. No case has been included which has been followed less than one year from the time of operation.

To be included, a patient's vision had to be not less than 20/200 before operation. If, however, the preoperative vision was less than 20/200, but came up to 20/200 or better after operation, the case was included. All cases in the following categories were excluded from the series:

(1) *All cases of glaucoma in negroes, the reason being that the course of the disease in this race is notoriously unsatisfactory, and the operative results are equally so.

(2) All cases which could not be adequately followed, and in which accurate visual, perimetric and tonometric records were not kept.

(3) All cases in which there was any question of faulty operative technic.

*Reese, A. B.: The Value of Early Operation in Chronic Primary Glaucoma. J.A.M.A., **113**:1204 (Sept. 23) 1939.

(4) All cases which were later subjected to cataract operation.

(5) All cases which were not followed a sufficient length of time after operation.

(6) All cases where there was any question of secondary glaucoma.

Of the 402 cases of chronic primary glaucoma which have been analyzed, we were able to select 92 patients, or 107 cases which met these criteria.

How Divided.—Rather than divide these cases into operative groups, we decided to make two groups: early and late. This classification is necessarily arbitrary. By early, we mean those cases in which the field defect was not more than 15° in any meridian, or the blind spot was enlarged not more than 10° in any diameter. All cases not in this category were considered as late. It was thought that possibly observation of the disk changes could be included as an additional dividing factor, but this is extremely variable and is dependent upon an individual's opinion. If the same observer had seen every case, then the degree of cupping and pallor would have definite significance. In general, however, we can say that for the most part the disks showed deep cups and pallor more often in the late group. The same reasoning applies to the depth of the anterior chambers, it being the opinion of the observing individual, and therefore a variable observation. In general, it can be said that shallowness was noted in about 60 per cent whether non-congestive or congestive.

Criteria of Success.—The visual field, tension and vision must remain as good or better than before operation at the end of the follow-up period. Whether or not pilocarpine was used has no bearing on the case, for when dealing with a dispensary case, we feel far greater security in having him use pilocarpine at home routinely.

Criteria of Failure.—It follows from the above that a case is considered a failure if, after operation, there is further loss of vision, further constriction of field, with or without elevation of tension. We considered many cases a failure when the tension was anywhere from 10 to 20, but where there was further field loss, even with preservation of central vision.

Definition of Primary, Chronic, Non-Congestive Glaucoma.—By primary, chronic, non-congestive glaucoma we mean those cases in which there are no subjective symptoms of congestion. There are no complaints of halos, iridescent vision, transitory blurring or pain, mild or otherwise. Here, there is but one complaint, loss of vision, and in the dispensary patient, even this is by no means a constant one. This, of course, is the old glaucoma simplex. This type of eye most often shows a deep anterior chamber, and under the gonioscope an open angle is often revealed.

By primary, chronic, congestive glaucoma we mean those cases wherein the patient complains of pain in any degree below the violent stage, halos, transitory blurring, iridescent vision, with or without the complaint of loss of vision. This type of eye usually shows a narrow anterior chamber, with the gonioscope revealing the angle partially or completely closed by peripheral anterior synechiae.

Early Non-Congestive Glaucoma (*Table 2*).—There were 24 patients in this group, yielding 31 eyes for operation. There were 21 trephines performed with 18, or 85.7 per cent, being successes, and 3, or 15.3 per cent, being failures. Two of the failures showed further loss of field, while the other failed to respond to a second trephine.

There were 10 iris inclusion operations done, 8, or 80 per cent, being successes, and 2, or 20 per cent, being failures, each of the latter failing to respond to further operation interference, a cyclodialysis in one case, and a trephine in the other.

In the early congestive group (*Table 3*), there were 22 patients, representing 25 eyes. Eight trephines were done, with 5, or 62.5 per cent, being successes, and 3, or 37.5 per cent, being classified as failures. This is an extremely small group, and it well may be questioned as to whether or not it is of any statistical value. Two of the failures showed further loss of field

EARLY NON-CONGESTIVE

Number of patients 24

Number of eyes 31

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	21	18	3	85.7	15.3
Iris inclusion	10	8	2	80.0	20.0

Table 2

EARLY CONGESTIVE

Number of patients 22
Number of eyes 25

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	8	5	3	62.5	37.5
Iris inclusion	17	15	2	88.2	11.8

Table 3

LATE NON-CONGESTIVE

Number of patients 26
Number of eyes 37

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	21	5	16	23.7	76.3
Iris inclusion	16	4	12	25.0	75.0

Table 5

and vision in spite of normal postoperative tension throughout the entire follow-up period. The other failed to respond to a second trephine, a cyclodialysis, and finally an iris inclusion.

Likewise in this group there were 17 iris inclusions with 15, or 88.2 per cent, successes, and 2, or 11.8 per cent, failures. The two failures showed further field decrease with normal tension. The fairly representative number of cases in this group is of some statistical value.

Reviewing these two groups together (*Table 4*), there were 29 trephines performed with 23, or 78.3 per cent, being successes, and 6, or 20.7 per cent, being failures. There were 27 iris inclusions with 23, or 85.4 per cent, being successes, and 4, or 14.8 per cent, being failures.

Late Glaucoma Non-Congestive (*Table 5.*)—There were 26 patients in this group, representing 37 eyes. Twenty-one trephines were done with 5, or 23.7 per cent, successes, and 16, or 76.3 per cent, failures. It is of particular interest to note that in 13 of the 16 failures the tension was controlled by the trephine, but the visual field continued to decrease. In the other three failures, the glaucoma was uncontrolled by cyclodialysis in two and another trephine in one.

Sixteen iris inclusions were performed with 4, or 25 per cent, successes, and 12, or 75 per cent, failures. This closely parallels the trephine group. Eight showed normal tension in spite of gradually contracting fields and further loss of vision. One was controlled by a trephine, another by a cyclodialysis, and two by iridectomies and posterior sclerotomies.

In the late congestive group (*Table 6*), there were 20 patients with 24 eyes. There were 8 trephines, with 6, or 75 per cent, resulting in a favorable outcome, while 2, or 25 per cent, were unfavorable. One of these showed a persistently normal postoperative tension, while the field was still being further constricted. The other was unrelieved by a cyclodialysis and, finally, a second trephine.

Of the 16 iris inclusions, 8 were successes and 8 were failures. In 6 of the 8 failures, the field was still decreasing in spite of normal tension. In another, a subsequent cyclodialysis relieved the elevated tension, but had no effect upon the decreasing field. In another the glaucoma was uncontrolled by a cyclodialysis.

Reviewing these two groups together (*Table 7*), there were 29 trephines with 11, or 37.9 per cent, successes, and 18, or 62.1 per cent, failures. A total of 32 iris inclusions were done, with 12, or 37.5 per cent, successes, and 20, or 62. 5 per cent, failures.

TOTAL EARLY NON-CONGESTIVE AND CONGESTIVE

Number of patients 46
Number of eyes 56

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	29	23	6	79.3	20.7
Iris inclusion	27	23	4	85.4	14.8

Table 4

LATE CONGESTIVE

Number of patients 20
Number of eyes 24

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	8	6	2	75.0	25.0
Iris inclusion	16	8	8	50.0	50.0

Table 6

TOTAL LATE CONGESTIVE AND NON-CONGESTIVE

Number of patients 46
Number of eyes 51

Operation	Number	Success	Failure	Per Cent Success	Per Cent Failure
Trephine	29	11	18	37.9	62.1
Iris inclusion	32	12	20	37.5	62.5

Table 7

DISCUSSION

It is to be noted that in the late group of glaucomas, no matter whether a trephine or iris inclusion was done, the results were strikingly similar: 37 per cent success and 62 per cent failure. These figures would, therefore, tend to show that given a late case of glaucoma, no matter what operation is performed, the patient has a little better than one chance in three of having his tension controlled with preservation of his vision and fields. At first glance, this may seem somewhat too hopeful, but again, attention must be called to the arbitrary classification between early and late glaucoma. When we first went over these records, we made a preliminary grouping where field changes were considerably more marked. Following the example of Algernon Reese,* we considered a case of late glaucoma to be where the field of vision had not decreased more than 30° instead of 15° in any meridian, with the blind spot enlargement being not more than 15° instead of 10° in any diameter. Using this classification, the number of late cases was considerably less, but, what was more important, the chances for success were markedly less. It is to be further noted that in the first group of early cases, there was a total of 46 successes and 10 failures regardless of the type of operation. Of the 10 failures, 6, or 60 per cent, showed further field constriction in spite of a normal tension. In the late group, of 23 successes and 38 failures, 28, or 73.6 per cent, of the failures were in the same category. In all of these failures the tension never went above 25 and the average was in the range of 15. As Reese* points out, the further field changes in the presence of low tension would indicate that if the vascular changes occasioned by the increased intra-ocular pressure which produce the peripheral field contraction have reached a certain momentum, so to speak, they continue to progress, thus producing progressive field defects in spite of normal intra-ocular pressure. There is no way of determining which case is going to continue to progress and which case is not. In reviewing these cases, no case revealed any definite clue.

*Reese, A. B.: The Value of Early Operation in Chronic Primary Glaucoma. J.A.M.A., **113**:1204 (Sept. 23) 1939.

CONCLUSION

We have tried to review briefly the glaucoma problem as we are finding it at the present time. Two findings were emphasized by this study: first, the striking difference between the successes and failures in the two groups regardless of the type of filtering operation. In early glaucoma the chances of success were over 85 per cent and in the late group about 37 per cent; the chances of success becoming increasingly less as the glaucoma was allowed to go on. Secondly, it seems to make absolutely no difference which type of operation is performed. The important thing is the time when it is done. The earlier the glaucoma is operated upon, the greater the chance of success.

DISCUSSION (*Abstract*)

Dr. William M. James, St. Louis, Mo.—The material presented in this excellent paper by Dr. Randolph is the result of years of careful clinical work backed by an adequate organization to maintain an active glaucoma clinic. Of 402 patients followed since 1934, 92 were selected for this study of chronic primary glaucoma.

The classification of the cases into early glaucoma, that is, before there has been a field loss of more than 15 degrees in any meridian or the blind spot has enlarged more than 10 degrees in any diameter, and into late glaucoma is particularly appropriate to bring out what I believe to be the author's main point, namely, that glaucoma is a disease requiring early surgical treatment. The choice of operative procedure is not important so long as the procedure is carried out before the full progress of glaucoma has been established. I believe the material presented establishes this point beyond controversy.

A second point which I think should be emphasized from the material is that operation was carried out in 50 per cent of the patients while they were still classified as early, before there had been a loss of 15 degrees in a single meridian or an enlargement of the blind spot to more than 10 degrees in any meridian. This necessitates the early recognition of glaucoma by the physician and patient alike.

Since 1934, I have used the iris inclusion operation almost exclusively. From the files at my office I have been able to find records of 16 patients who fall into the group discussed by Dr. Randolph. There were 23 eyes in this group. Four were early glaucoma, three

were successful, one was complicated by a postoperative uveitis. Eight were late glaucoma. The successes and failures were equally divided. Eleven were terminal glaucoma having tubular fields and less than 20/200 visual acuity. Six successes were obtained; there were five failures. This group, although small, tends to confirm the conclusions of Dr. Randolph and Dr. Robertson. Glaucoma is a disease requiring early surgical treatment.

Dr. John H. Burleson, San Antonio, Tex.—It occurs to me that the essayist's classification of his cases into early and late is the answer to the type of operation to be performed. Obviously, an eye that has been under long-continued pressure of 40 or more, which could not be controlled, would call for a more drastic procedure than an eye with a slight elevation in which the field was not much disturbed.

The fact that we have no standardized procedure would indicate that operative glaucoma is still a subject of serious discussion.

We all recall Elliott's visit to the United States. I had the pleasure of hearing him lecture and witnessing his trephine operation. I was thoroughly sold on the procedure; some of our best men still are. While I have had many beautiful results following the trephine, I confess of late years I seldom employ it. My reason is that I had too many late postoperative complications. I do not believe it the operation of choice. Wheeler and Gifford recommend operations which combine iridectomy and cyclodialysis in late cases. While their technic may vary a little, both embody the principles advocated by Jervey.

Critchet of London, in 1858, reported cases of iris inclusion for the relief of tension. His operation did not become popular, as oculists at that time in general feared irritation or infection following it.

Iris inclusion continued to be a surgical accident until Holth reported his series of iris inclusion cases in 1906. Since then many operators have reported cases and now the procedure has become a definite surgical entity.

As the essayist points out, iris inclusion is and should be done for several reasons, and should be done early. It is easy to do, it is safe, and you get good results in about 80 per cent of cases.

The technic of iris inclusion operation is not included in this discussion. The most frequent accident, however, is damage to the lens capsule. This can happen to the most skillful operator.

Goar, of Houston, Texas, in an article read before the Section on Ophthalmology of the American Medical Association, describes an incision made with the point of an inverted keratome about 1 mm. behind the corneal junction. He describes it as a "scratch incision." After the ciliary body is exposed, a thin blunt spatula is introduced between the iris attachment and the cornea, iris forceps introduced, the iris delivered, and the operation finished in the usual way. This method of operation seems to me to be a distinct advance in iris inclusion.

In the handling of late neglected cases, where considerable permanent damage has been done, I prefer an operation that was described by J. W. Jervey, Sr., of Greenville, South Carolina, which he called scleral postiridectomy. His paper was read before this Section about ten years ago, and most of you are familiar with his procedure. I prefer this operation to the trephine for the reason it permits a cyclodialysis to be done at the same time, which could not be done following a trephine.

In a neglected case of glaucoma, where the iris angle is practically obliterated, if our theory of establishing drainage is correct, cyclodialysis is certainly a logical procedure. The fact that it is occasionally followed by a stormy reaction for a few days should not condemn it.

I have for the past thirty years been connected with a clinic composed largely of Mexican and negro patients. My experience has been that the Mexican is even more prone to develop glaucoma than the negro. We have had ample opportunity to study different operative procedures. For the past ten years the operation suggested by Jervey, supplemented with a cyclodialysis, has been a routine with me. I prefer it to a trephine in late or neglected cases. My end results are better with fewer postoperative complications.

All agree that medication and massage should follow glaucoma operation.

The report of cases presented by the essayist adds to the growing conviction that iris inclusion is becoming the operation of choice in early cases.

Dr. Tullos O. Coston, Oklahoma City, Okla.—Statistical studies of the type presented here by Drs. Randolph and Robertson are of great value in forcing us to evaluate the various operative procedures. One tends to become too satisfied wih his own technic and to disregard useful methods which are being successfully employed by others. For example, only a few iris inclusion operations had ever been done at the Wilmer Institute prior to 1934. This operation was contemptuously referred to as the "iris tangling" operation and the house staff was forbidden to use it. During a change of directorship of the clinic, the resident performed several dozen iridencleises. The results were so gratifying that the long-condemned "iris tangling" method was adopted by practically all members of the staff.

Drs. Randolph and Robertson have emphasized a point which needs reemphasizing in any discussion on glaucoma, namely: the value of early operation. Progressive visual field changes, or increased tension, or both, are clear, urgent reasons for operative interference. This has been said many times and has been often disregarded. One is astounded by the number of opthalmologists who refuse to operate until marked contraction of the visual fields has occurred and the chances of success thereby are reduced by more than half.

The explanation for the continued loss of visual field following a successful operation has been said to be due to vascular changes brought about by the increased tension prior to operation. So eminent an ophthalmologist as Harrison Butler, of England, in a recent personal communication, declared that, in his opinion, the optic disk simpy was more "culpable" in some cases and that increased tension was incidental. This opinion is much at variance with that ordinarily accepted, and coming from one who has enjoyed a full and distinguished career in ophthalmology in England, I should like to quote directly from his letter. He says:

"I have now done well over 100 cases [iridencleisis] and I still think it is by far the best operation for chronic glaucoma. I think that most of my colleagues at the Birmingham Eye Hospital have abandoned trephining for iridencleisis and all are satisfied with the results. I have now followed up cases for 15 years or more and in many there has been no progress in the glaucoma.

But you know, as well as I do, that a large number, in spite of perfectly normal or subnormal tension, go quietly blind. The disk goes on cupping and the fields contract and eventually blindness ensues. In my humble opinion, glaucoma simplex is primarily a disease of the optic nerve which becomes unduly culpable. Raised tension is incidental. It is, as we all know, frequently not present. As far as my own experience goes, iridencleisis is by far the best operation."

Personally I, too, have found iridencleisis much more satisfactory than trephine.

I should like to ask Dr. Randolph these questions:

Did late bleb infection occur in any iridencleisis cases?

Did sympathetic ophthalmia develop following either type of operation?

What was the incidence of postoperative cataract?

What statistics are available for negroes?

Dr. W. P. McGuire, Winchester, Va.—The authors say that there is practically no difference in results whether a trephining or an iris inclusion type of operation is done. With that in mind it might well be argued that an iridencleisis is as good an operation as is trephining with peripheral iridectomy. Now, I may be criticized because, while I have never done an iris inclusion operation, I am taking issue with that particular surgical procedure. However, from a study of the operation it seems to me that it violates surgical principles to some extent. We all know that one of the complications to be avoided following cataract extraction is a prolapse of the iris, and yet, in glaucoma, we are deliberately trying to prolapse the iris by means of an iris inclusion operation. If a trephining works equally well, and the figures obtained by the authors confirm the fact that it does, why should we try to put the iris pillars up beneath the conjunctival flap and out of the anterior chamber? It would seem that we are certainly disturbing the anatomical relationships in the anterior segment of the eye by this procedure.

The authors say that one reason they changed from trephining to the iris inclusion operation was that they had two cases of late infection of a conjunctival bleb following trephining. The late Dr. John M. Wheeler taught that the ideal postoperative condition of the conjunctiva after trephining was not the formation of a bleb, but a smooth, slightly edematous bulbar conjunctiva over a large part of that sector of the globe where the trephining was performed. It would seem that late infection of a bleb could result only from a rupture of that bleb, however small the rupture might be, and the break should result only from a very thin conjunctiva over the trephined area. I believe the procedure outlined by Dr. Wheeler tends to prevent, in large measure, the formation of a bleb of conjunctiva and to promote the formation of a large edematous filtering area which is relatively thick. This procedure is as follows: either before or after the speculum is inserted 2 per cent procaine hydrochloride is injected beneath the upper bulbar conjunctiva until it balloons that tissue from the upper fornix to a point almost down to the horizontal plane of the globe. This distends the subconjunctival tissues and allows the lines of cleavage to be much more easily demarcated. The conjunctiva is then widely incised near the upper fornix and undermined downward, keeping the blades of the scissors just beneath the conjunctival surface until a point about 4 mm. above the limbus is reached. The blades of the scissors are then pointed toward the sclera and the dissection is carried through the distended subconjunctival tissues until the sclera is reached. The subconjunctival tissues are then undermined downward to the limbus. Three sutures are inserted for later closure. The lateral sutures pass only between the conjunctival margins, but the central suture first picks up the posterior conjunctival margin and is passed through the tendon of the superior rectus muscle and then takes a good bite on the conjunctival flap. This gives a good, firm anchorage to the central suture and allows traction to be made upon it, thus pulling the distended subconjunctival tissues upward from the trephine opening. I believe that this suture prevents the clogging of the trephine opening by the subconjunctival tissue, and since this tissue has been distended by the procaine and we can be sure we have dissected down to the sclera, we obtain a relatively thicker flap than by any other method. I realize that ballooning the conjunctiva with an injection is not generally practiced in the trephining operation, but I believe it makes the dissection much easier and much more accurate.

I am heartily in accord with the essayists' opinion that glaucoma should be operated upon early. It is well known that if the field changes have progressed beyond certain limits the vascular supply to the optic nerve is so disturbed by the constantly increased tension that operation fails to stop the progress of the field changes even though it may reduce the tension, a fact which this paper brings out admirably. In fact, at the risk of being thought a radical, I must say that the more I see of glaucoma the more I become convinced that when the diagnosis is made operation should be the next step.

Dr. J. W. Jervey, Greenville, S. C.—The essayist has shown us that he has anywhere from 25 to 85 per cent successes in glaucoma operation. Now, it depends upon what you mean by success. The only possible real construction is that you get a reduction of tension; that is all. That is success. Now, suppose that I were to tell you the method by which you could get virtually 100 per cent successes, what would you do about it? I know exactly what you would do about it without having any one of you answer me. You would just simply do nothing. You would do exactly what you have been taught to do all your life, and you would follow the same old routine and the same old iridectomy, and you would not get any further than we have gotten already.

The way to reduce tension is to open the canal of Schlemm. When you make an anterior iridectomy and pick the iris up anteriorly and draw it out through the incision in the cornea, what have you done? You have not opened the canal of Schlemm except accidentally. The traction on the iris has pulled it away from the encircling area where it is bound down to the canal of Schlemm and you usually do pull it loose, but that is not a positive direct operative procedure.

The canal of Schlemm must be opened to open the pathway for the fluid. It can be easily and harmlessly done. I have demonstrated it several times. Men in the American Ophthalmological Society were taught to do an anterior iridectomy, and they are going to keep on doing that until the end of their day.

Dr. Phil M. Lewis, Memphis, Tenn.—From 1923 to 1933, I did for acute glaucomas iridectomies, and for chronic glaucomas trephines. I was taught by men very

like Dr. McGuire that iris inclusion operations were something to be abhorred, and I never did one until the early part of 1934, when Dr. Constantine, of Birmingham, Alabama, showed me his technic in performing the Lunsgard iris inclusion operation, called iridencleisis. Since that time I have used it almost routinely, because on trying it on several cases I found it very easy to do and the results extremely satisfactory. It can be done on any type of glaucoma. It can be done on acute cases. The harder the eye is, the more easily the iris comes out; you do not have to go inside the eye at all and the incision can be made without a keratome, which might easily damage the lens in cases with very shallow anterior chambers. The incision can be very nicely made ab externo. In fact, I usually do it that way, with a knife. You can use either the Lunsgard knife, which most of you probably have seen, all the instrument companies have it, or you can use a small Bard-Parker knife. Instead of making the incision straight through the sclera, I think it should be slightly beveled so that it is easier to get your forceps or a blunt iris hook into the eye, in cases in which the iris does not present in the wound spontaneously. The blunt Terrell hook is a good instrument to bring the iris out, or one can use iris forceps if they are preferred.

Many of the cases I have done have been on the charity services of the different hospitals in Memphis, and it has been practically impossible to follow them any length of time, so any statistics that I could give you probably would be of very little value. As far as I know, in no case upon which I have done an iridencleisis have I had any late infection, and I have never had a case of sympathetic ophthalmia following it. I understand some cases have occurred, and I may have to retract that statement at a later time.

In a somewhat smaller series of trephines, I have had two cases of late infection that came on from one to two years afterwards. In neither of these cases had the bleb been broken. A purulent conjunctivitis developed and the infection went directly through the conjunctiva and caused panophthalmitis and complete loss of the eye.

Those of you who have not tried iridencleisis I think should try it. It is a good operation and easy to perform.

Dr. Randolph (closing).—Dr. James asks the incidence of postoperative uveitis after iris inclusion operations. Inasmuch as we have done many more iris inclusions than trephines in recent years, my opinion may be tempered by this. However, I feel that the incidence of uveitis is less in iris inclusions than in trephines.

In answer to Dr. Coston: we have seen no case of late infection of the iris inclusion bleb. In this series studied, we had no case of sympathetic ophthalmia. Since last May, however, there has been a case of sympathetic ophthalmia on the private service. I am unable to answer accurately Dr. Coston's question in regard to postoperative cataract. I can only say I think it is less than with trephines, although perfectly frankly, I do not know why it should be. He also asks about glaucoma in negroes. This is a separate study we are now making and will be the subject of a later paper.

Dr. McGuire mentioned deliberately trying to incarcerate a pillar of iris in an iris inclusion operation, whereas in a cataract operation we try to prevent such a thing. In a cataract extraction, when a prolapse occurs, it is not a true incarceration, but rather a bleb of iris tissue which has forced its way through the corneal section and thus become pinched off; whereas in an iris inclusion the affair is not a prolapse, but a controlled incarceration always covered by conjunctiva.

SOME WHYS AND WHEREFORES RELATIVE TO NASAL SINUS HISTOPATHOLOGY*

By JOSEPH D. HEITGER, A.B., M.D.
Louisville, Kentucky

From the era of Hippocrates to the present time, panaceas and nostrums have been periodically foisted upon a gullible public suffering from so-called "catarrh" and nasal sinus disease. Inaccurate statements have been made by physicians whose information has been inadequate, and permitted to be published even in recognized medical journals, by editors who should have known better. As a result, laymen and many gullible members of the medical profession have accepted this information as authentic. The advent of the radio has served further to amplify this misinformation, and another type of "M.D.," namely, the magazine digest, has added its share in disseminating the false propaganda.

The prominence given these false statements has resulted in making the public sinus-conscious, with the slogan, "Once a sinus disease always a sinus," apparently adopted as its marching song. In the light of ordinary reason and logic, including the four principles and ten categories of Aristotle, the misinformation should not have gotten past its own spelling. It has not only jumped these hurdles, but has taken those of known embryology, anatomy, physiology, and pathology in its onward stride. I ask you why, and again why these conditions exist, and what can we begin to do about them. Mark Twain once remarked that a lie could get up and make a trip around the world while the truth was getting up and putting on its clothes. Properly analyzed, that statement can be classified as a half truth, and I am of the opinion that the whole truth can do a better strip tease act than any half truth.

With known facts regarding the physiology and pathology of the nose and its accessory sinuses at our disposal, we can restore the con-

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fidence of a doubting public in our ability properly to treat diseases of the nasal sinuses. The remedy exists in making these facts more widely known and directing our therapeutic measures against diseases of the nasal sinuses, so that they may be better understood by the public as well as the profession.

Prevalence of any condition makes for gullibility of the public. Just recently, a Gallup pole stated that there were thirteen millions of our present population suffering from colds. Suggestions have been made in medical journals that these are the forerunners of another influenza epidemic, with a preponderance of the cases in the State of Texas. We must not forget that all these are potential sinus cases of varying degrees. Time limits any lengthy discussion of sinus panaceas, but I want to call your attention to two of them.

The first was the "short wave health machine." Get this condensed quote from a well-known health magazine:

"You'd better get a shot of short wave," said a friend of mine when I complained of racking sinus pain in my face. "Short wave?" I inquired, wondering what radio had to do with sinus trouble. "It's a wonderful treatment for sinus," my friend insisted, and he gave me the name of a prominent nose and throat specialist. I went. The doctor examined me, found the sinus draining, then sat me down in front of a polished box that looked something like a radio set. Two long metal arms were pivoted at the side of the box, each arm ending in a round, flat pad. The doctor adjusted the pads to my temples and turned a switch. There was a low humming. After a minute or so I felt a gentle warmth creep through my tortured face. As the doctor switched off the apparatus, he said: "Come back tomorrow if you still have that pain." "I'll be back," I answered grimly. I had tried all sorts of things for my sinus trouble: sun lamps, hot applications, cleaning outs; and nothing had ever done much good. Yet, an hour after I left the doctor's office the racking pain had vanished. Next morning I woke with the first clear head I had known in weeks." "How long," I asked myself, "has this been going on?"

Now I ask you, is not that a sweet morsel? Further on in the article we found this statement:

"In treating sinus infections, care must be taken not to pass strong radio waves through the brain."

I cannot help but wonder what was between his cortex, if one existed, and his dandruff. Now, mind you, this article was published in a journal that we are urged to display in our offices for the education of our patients. The above quotation I would call a form of dishonesty and suavity of expression that completely submerges the truth.

The second panacea was born last April, not on the first, but a few weeks later, in a well recognized medical journal. This extolled the virtues of a 5 per cent solution of sodium sulfathiazole. Just spray it into the nose twice a day and the majority of cases of sinus disease vanish as the dew before the rising sun. So simple, is it not? Can you imagine a worse distortion of known facts regarding the physiology and pathology of the nasal sinuses? Ignorance which always speaks for itself, empiricism, and *post hoc ergo propter hoc* reasoning form the foundation stones for much of this panacea "skuldruggery."

The pattern of empiricism is something like this: an individual becomes ill, a drug is given, and if he recovers, the drug produced the cure. On the contrary, if he dies, the failure is explained by the reasoning that not enough or too much of the drug was given, or it was not given early enough.

To distinguish coincidence from consequence, certain fundamental criteria have been set up to offset empirical reasoning. They should not be forgotten, and we must ever remember that many diseases and symptoms are self-limited, regardless of what is done for them. Nature heals and cures. Drugs, at best, are merely adjuvants. Chronic diseases are characterized by spontaneous remissions and exacerbations. Symptoms are often due to, and almost invariably aggravated by, worry and emotional disturbances. Symptoms, regardless of their cause, are often improved through the expectations of therapeutic benefit, and finally, the fallacy of *post hoc ergo propter hoc* reasoning becomes a fundamental proposition to avoid.

Kant, the great philosopher, said that the tendency of the human mind to indulge in *post hoc ergo propter hoc* reasoning was the main cause of all human error.

Panacea patter seems to have blackjacked, brass-knuckled and punch-drunked many of our basic facts, with a Mickey Finn slipped in here and there to make the knock-out complete.

Where diametrically opposed difference of opinion exists, it is self-evident that one opinion is right and the other wrong, or they are both wrong, because two contradictories cannot logically exist.

Honest difference of opinion arises only because some one has failed to take into consideration the fundamental principles that apply to anatomy, physiology and pathology of the nasal sinuses.

A broad view of the subject of panaceas and

nostrums must convince us that we should indict Barnum's famous statement regarding the "minute births" as a gross underestimation.

Because of the prevalence of nasal sinus disease, the big and little "cons" regarding its therapy will go on, but if we go back to fundamentals, we can do much to mitigate their effect and retain the respect and confidence of the public.

Diagnosis and logical reasoning must ever remain our sheet anchors in this progressive movement. Diagnosis involves the consideration of many complex factors which are simultaneously present. In the analysis of these factors, the diagnostician's clinical sense and experience must be supplemented by every physical, clinical, chemical and laboratory means available. Diagnoses are sometimes erroneous not only because physical signs are masked and therefore elusive of recognition, but also because logical thinking has not been employed in analyzing the facts presented.

Despite the variability in the anatomy of the nasal sinuses, a normal pattern may be said to exist. This pattern is well known, so I will not burden you with its description. While we know a great deal regarding the physiology and pathology of the nasal sinuses, there is still much to be learned.

The proportionate relationship of structure, function and dysfunction becomes the object of our diagnosis. Defects in structure produce defects in function, and their correction forms the bases of our therapy, medical or surgical, which in turn is dependent upon existing pathologic conditions.

In consideration of diagnosis and treatment of nasal sinus disease, the first essential is the evaluation of the factors of pathologic physiology and pathologic anatomy present. Allergy and vascular phenomena often complicate the picture and require differentiation in our diagnostic and therapeutic efforts. The physiologic viewpoint in the diagnosis and treatment of sinus disease has been brought to our attention by Lillie and his pupils and Proetz and his associates. The mere mention of their names will recall to you their publications upon nasal physiology and its importance in simplifying the problem of the differential diagnosis between chronic sinus disease and the conditions that simulate it.

Differential diagnosis based upon the above mentioned principles enables us to classify the surgical and nonsurgical types of disease present in the lining membranes of the nose and nasal sinuses. Lack of precise histopathologic knowledge in the past has led to the indiscriminate removal of tissues essential to the physiology of the nose and nasal sinuses, and the application of formidable surgical procedures to conditions for which they could not logically be expected to produce any beneficial result. New symptoms have often been added to the old ones present, bringing these misdirected surgical procedures into disrepute among uninformed physicians and the public. This has been one of the factors favoring the origin of the aphorism, "Once a sinus, always a sinus."

The importance of a clearer knowledge of the significance of the histopathology of the nasal sinus mucosa can be best determined by a quotation from the late Sir Charles Ballance, of England.

> "Want of agreement among serious workers about a grave question of surgical treatment arises either from the lumping together of clinical conditions having an essentially different pathological basis, or from essential pathological conditions not being well understood. All true and lasting surgical practice is based upon pathology, and when once the pathology of an affection is clearly appreciated, divergence of view as to its treatment ought to disappear."

The fundamental pathologic mechanisms consist of exudation, infiltration, proliferation, and degeneration. The alterations produced by exudation, infiltration and mild degrees of proliferation are frequently reversible and capable of return to normal. Marked degrees of proliferation and degeneration produce morbid changes which are irreversible, and return to normal is impossible. This irreversible condition constitutes the criterion of chronicity.

For some years I have used a mnemonic, employing the simple mechanisms mentioned above, which has assisted me in keeping them in mind. If I were to tell you some one had been "gyped" you would know what I meant, namely: some one had been fooled or cheated. If I should remark that a patient suffering from nasal sinus disease had been "eipd," you might wonder what I meant. Using "e" for exudation, "i" for infiltration, "p" for proliferation, and "d" for degeneration, the mnenomic is completed. The degree to which such a patient has been "eipd" depends upon the degree to which these fundamental mechanisms have developed. It has helped me, and its use might help you in simplifying the idea of the pathologic processes involved.

Before considering the histopathology of the nasal sinus mucosa, a review of the histology of the sinus mucosa would be in order. Semenov has given us, perhaps, the best description of

the normal microscopic anatomy of the sinus mucosa, which is as follows: the epithelium consists of a single layer of pseudo-stratified ciliated columnar cells. Three types of cells are found in the epithelium, namely: basal cells with round nuclei, ciliated columnar epithelial cells with oval nuclei, and goblet cells produced from the columnar epithelial cells. The goblet cells may be considered as unicellular glands which produce mucus.

The epithelium rests on a basement membrane, under which we find the subepithelial connective tissue, constructed roughly in three levels consisting of the superficial stroma (capillary level). Next below this, we find the loose intermediate stroma (glandular level). In the frontal, ethmoidal and sphenoidal sinuses, the glands are rare, rudimentary, and found in the vicinity of the ostia. In the maxillary sinuses, the glands (mixed tuboalveolar type) are found on the medial or nasoantral wall, the lateral wall being devoid of glands. The third level, the vascular bed, or deep stroma, is more compact, the blood vessels and nerves with the lymphatics following the lining through the ostia into the lymphatics of the nose. The next layer is the periosteum, which is of two types, a definite and well formed type, with better resistance, and a rudimentary or poorly formed type with less resistance. The subperiosteal level presents the line of cleavage with occasionally aberrant glands. Under the periosteal level, we find the bony wall of the sinus.

The normal adult sinus mucosa is about 0.1 mm. thick, or about the thickness of a cigarette paper, and the same thickness as the normal ear drum. The cilia are always present. There are few goblet cells, and no evidence of edema or leukocytic infiltration. The subepithelial tissue acts as a supporting stroma, and takes an active part in local immunity. Infection or irritation produces an immediate mesenchymal reaction in the arteriocapillary network and loose areolar stroma.

When irritated, this mesenchymal tissue first becomes edematous, resulting in a loose soft myxomatous type of connective tissue. Chronic edema is the underlying mechanism in the production of degeneration, polypoid sinusitis and mesothelial cyst formation.

The epithelium varies in thickness from 25 to 50 micra (¼-½ the thickness of the entire mucosa). When it exceeds 50 micra, hyperplasia is beginning.

Mucoid degeneration of the epithelium is frequently observed, being manifested by an abnormal number of goblet cells, and the loss of cilia over more or less extensive areas, with resultant piling up of mucus.

Mucoid degeneration, coupled with the discharge of an abnormal amount of mucus in the nose and throat, justifies the diagnosis of catarrhal sinusitis. In addition, there is considerable congestion of the nasal mucosa, which shrinks readily. There is little hyperplasia and infiltration, but there is a pathologic filling and emptying by the Proetz displacement method.

After chronic mucoid degeneration runs a protracted course, hypertrophy and hyperplasia may appear as defense reactions.

These cases are probably the most frequent seen today. In some of them, it becomes difficult to determine the difference between pathologic physiology and pathologic anatomy. These cases are nonsurgical. Chronic edema is responsible, according to its degree for pallor, pebbling and polyposis, in both the nasal and sinus mucosa.

Venous and lymphatic stasis are probably both necessary for the production of polyposis, venous stasis alone being inadequate.

Polypoid degeneration is always pathologic, the mucosa being greatly thickened and presenting two types of cysts, the retention and interstitial, or mesothelial. The former are due to degeneration of submucous glands, and are lined with epithelium, whereas, the latter are produced by rupture of connective tissue from the pressure of excess fluid in the tissues.

Allergically altered mucosa is characterized by a combined catarrhal degeneration of the epithelium, marked edema, eosinophilia, definite hyalinization of the basement membrane, and myxomatous degeneration of the connective tissue.

Suppurative sinusitis is characterized by a great increase in the number of polymorphonuclear leukocytes with definite tissue necrosis, epithelial destruction and often fistula formation with osteitis and softening of bone occurs.

Perivascular connective tissue infection frequently causes extension of the suppurative process.

Suppurative sinusitis is always a surgical problem. It may occur in a normal mucosa, or as a secondary infection in allergically altered mucosa.

Histopathologic examination of sinus mucosae removed surgically shows a preponderance of

purulent sinusitis, about 75 per cent, as compared to the nonpurulent hyperplastic, polypoid, and cystic sinusitis, which rates about 25 per cent. About 25 per cent of purulent maxillary sinusitis is of dental origin.

Nonallergic cases show about 48 per cent, manifest cases 17 per cent, and equivocal allergic cases about 35 per cent.

Exudation will thicken the mucosa about ten times, which corresponds to a thickness of about 1 mm.; proliferation and infiltration will increase this another millimeter, whereas degeneration will add another millimeter or more.

If there is evidence of chronic sinusitis, radiographic studies may give corroborative proof. Attention should be directed to the anatomic configuration of the sinuses, possible atrophy, hypertrophy, or destruction of their bony walls, and the presence of thickened mucosa, or secretion in the sinuses. The injection or introduction of radiopaque substance may assist the diagnosis in some cases. Laminographs may occasionally reveal pathologic processes not seen in ordinary simple or stereoscopic films.

Time limits the discussion of endocrines, lysozyme, x-ray, diet and general physiologic factors, including chilling and rest. I merely mention them, in the hope that the discussants will include them in their statements.

The histopathologic changes, shown by the slides, occurring in catarrhal, allergic, chronic hyperplastic and chronic suppurative sinusitis are to be considered.

It is reasonable to expect restoration to normal of a sinus mucosa affected by simple edema, with slight hyperplastic changes of both the epithelium and the superficial layers of the tunica propria, by local treatment and the surgical establishment of adequate ventilation and drainage.

Why should such procedures have much curative effect on cystic degeneration, multiple abscesses in the deeper layers of the sinus mucosa, periostitis, osteitis, marked edematous fibrosis, and polypoid degeneration?

Why, by the wildest stretch of the imagination and wish thinking, could the panaceas mentioned have the slightest curative effect?

No one would consider breaking off the crown of a tooth down to the gum margin as adequate treatment for a tooth that needed extraction. Yet analogous procedures are being attempted by the so-called "conservative" measures in an absurd effort to cure sinuses containing hopelessly degenerated mucosae, or surrounded by disease which has extended into their bony walls.

Careful, painstaking study, and diagnosis of chronic sinus disease should always precede any decision regarding surgical measures, but when once the final decision is made, management should be selective, adequate, and complete.

In dealing with rigid wall cavities, the dice are loaded against us, but an intimate knowledge of the histopathology of the nasal sinuses will place the percentage in our favor, and tend to make treatment less empirical and more logical.

Let us always go back to the fundamentals of anatomy, physiology and pathology in making our decisions.

In closing, may I recall the words of the immortal Kipling,

"Lord God of Hosts, be with us yet, lest we forget—lest we forget!"

and leave with you the thought that there is no substitute for brains and time: brains properly to evaluate our findings, and time to give them more or less certitude.

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Discussion follows paper of Dr. Hollender, page 369.

NASAL AND SINUS SURGERY

A CRITICAL REVIEW OF THE CAUSES OF UNSUCCESSFUL END RESULTS*

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The assumption that the end results of nasal and sinus surgery are highly satisfactory is refuted by data obtained from 154 rhinologists by the questionnaire method (*Table 1*). The average of "cures" from nasal surgery was reported as 71 per cent; from sinus surgery 42 per cent. These estimates approximate the average results calculated on the basis of personal questioning of a series of 250 patients operated upon and questioned over a period of three years. In 112 nasal and 138 sinus cases observed (but not operated upon by me) during the period mentioned, the average of satisfactory results in the nasal cases was 65 and in the sinus cases 38 per cent (*Tables 2* and *3*). If these figures indi-

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cate the maximum in results attainable by present day methods then further inquiry would be idle. However, an analysis of our failures convinces me that the percentage of successful end results can be increased, for which reason it seems useful to pursue two main objectives: first, to determine the causes of unsuccessful end results of nasal and sinus operations; and second, to offer suggestions with regard to reduction of the percentage of failures to a minimum.

SECONDARY CONSIDERATIONS

In order to attain our objectives the following questions must first be answered:

(1) Is it possible to select case material so that more successful end results from operations can be anticipated?

(2) What advances in medicine have changed the indications for surgical intervention in nasal and sinus disease?

SELECTION OF PATIENTS FOR OPERATION

It is not always possible to anticipate a favorable result from a nasal or sinus operation. Under proper conditions, however, and especially in the absence of active infection, allergy, organic disease or malignant neoplasms, the prognosis need not be speculative. Other factors enter into the problem and must be duly considered, the most important, of course, being the extent of the pathologic process.

In this connection one must not necessarily define "successful end result" to imply "cure" in the narrow sense of the word. It refers rather to a state of improvement in which the patient is rendered symptom-free. It stands to reason that under such conditions the underlying pathologic process might not have been completely eradicated. I have reference particularly to a hyperplastic state of the nose or of one or more of the nasal sinuses.

Hosen and Tyner[1] state that to effect a cure in a sinus infection a sterile condition must be obtained.

"A clinical cure is effected when the washings are negative macroscopically, which means free of visible pus or mucopus."

These authors admit, however, that this type of cure is temporary and recurrences soon take place. They add:

"A bacteriological cure is permanent and to obtain this state the washings from the sinus must be negative microscopically, which means free of bacteria. This freedom of bacteria denotes sterility."

Grove and Farrior[2] reject this criterion on the ground that:

"A clear return flow from antral irrigation may be sterile, but a heavy growth of one or more organisms may be cultured from membranes removed at operation."

Here as elsewhere the term "cure" must be qualified. There is, I believe, a decided difference between clinical cure and pathologic cure. We frequently produce the former by complete removal of the underlying pathologic conditions with the minimum disturbance of function, but

DATA OBTAINED FROM QUESTIONNAIRES. NUMBER OF QUESTIONNAIRES MAILED, 400; RESPONSES RECEIVED, 154; NUMBER OF RHINOLOGISTS COMMITTING THEMSELVES ON PERCENTAGE OF NASAL AND SINUS OPERATIONS PERFORMED, 112; NUMBER DESIGNATING SPECIFIC CAUSES OF FAILURES, 108

Per Cent of Cases in Which Surgery is Performed	Operation Giving Most Satisfactory End Results		Does Indicated Rhinologic Surgery Enhance Allergic Therapy?		Per Cent of "Cures" from Nasal Operations	Per Cent of "Cures" from Sinus Operations
			Yes	No		
	S.R.*	81				
	A.W.	28				
	C.L.	40				
	E.	5				
9.4			101	53	71	42
	Total No. of Quest. 154					

*S.R. Septal resection; A. W. Antrum window; C. L. Caldwell-Luc; E. Ethmoidectomy.

Table 1

we probably seldom attain the latter in rhinologic practice.

Lack of systematic selection of patients for sinus surgery is exemplified in a recent symposium[3] dealing with the final results of operations for chronic suppurative paranasal sinusitis. The problem of selection of patients for certain operations is overshadowed by the emphasis placed on local indications for surgical intervention. Hempstead[4] brings this out when he remarks:

"To determine the type of operation to be used, a careful preoperative study of the maxillary sinus should be made."

While this author states that treatment must be individualized, he leaves one with the impression that he has a preference for the intranasal maxillary sinus operation without special regard for the selection of patients for this operation, because with it improved end results are anticipated. If, however, the good results in 97 per cent of 1,634 cases gathered from the literature (as reported by Hempstead) are supportive evidence of the adequacy and effectiveness of the intranasal operation for maxillary sinusitis, one wonders whether the emphasis placed upon the selection of patients for special surgical procedures has not a more theoretic than practical basis.

That certain operations are carried out by personal preference rather than on the selection of case material is further supported by the general application of the Caldwell-Luc operation for maxillary sinus disease. Thus Salinger[5] has no hesitancy in stating that the Caldwell-Luc operation is the most satisfactory surgical procedure about the nasal accessory sinuses and the one which should yield the highest percentage of good results in conformity with certain principles which he sets forth. Here again, as in the preceding situation, the impression is left that a special surgical operation is preferred for maxillary sinus disease because of its superiority over other procedures and not because of its more satisfactory application on the basis of selection of case material. So long as personal preference overshadows scientific reasoning, so long will controversy continue on the surgical management of sinusitis. The numerous operative technics constantly being advanced are the best evidence of the unsettled state of this problem.

ADVANCES IN MEDICINE CHANGING INDICATIONS FOR RHINOLOGIC SURGERY

If the 154 rhinologists who have responded to my questionnaire represent a fair cross section of current opinion concerning the problems under discussion, one must conclude that the indications for nasal and sinus surgery have been narrowed down appreciably. The relationship of the ductless glands[6] to rhinologic conditions has been suggested, although no entirely satis-

END RESULTS OF NASAL OPERATIONS (PERFORMED BY OTHER RHINOLOGISTS) BASED ON VERBAL QUESTIONING OF SERIES OF PATIENTS COLLECTED OVER A PERIOD OF THREE YEARS

Operation	Total No. of Cases	Males	Females	Good Clinical Result	Partial Improvement	Unimproved
Septal resection	79	56	23	51	16	12
Turbinectomy	9	7	2	6	1	2
Removal of polyps	24	15	9	16	4	4
Totals	112	78	34	73	21	18

Table 2

END RESULTS OF SINUS OPERATIONS (PERFORMED BY OTHER RHINOLOGISTS) BASED ON VERBAL QUESTIONING OF SERIES OF PATIENTS COLLECTED OVER A PERIOD OF THREE YEARS

Operation*	Total No. of Cases	Males	Females	Good Clinical Result	Partial Improvement	Unimproved
Frontal	3	3	0	2	0	1
Ethmoid	14	12	2	4	2	8
Sphenoid	8	5	3	2	2	4
Intranasal antrum	41	25	16	21	16	4
Denker or Caldwell-Luc	26	17	9	10	9	7
More than one sinus	36	26	10	11	16	9
Nasal and sinus	10	7	3	3	5	2
Totals	138	95	43	53	50	35

*In those instances in which the name or character of the operation could not be determined, the cases were grouped under the particular sinus operated upon.

Table 3

factory explanation has been advanced. In recent years vitamin deficiencies[7] have been claimed to be underlying etiologic factors of nasal and sinus infections, especially in children. Now, more than ever before, the influence of organic diseases[8] on chronic sinusitis is being properly appreciated. The most important consideration, however, in the light of modern advances in medicine is allergy.

To arrive at a fair estimate of the incidence of allergy in rhinologic practice, Baum[9] analyzed the records of his last 2,000 patients.

"Of these, 700 came with primary nasal complaints or were referred for examination of the nose and sinuses as possible sources of involvement elsewhere in the body. Of the 700 cases, 245 were surgical and 455 non-surgical. In the surgical group a diagnosis of some form of nasal and sinus allergy was made in 65, or nearly 26.3 per cent. In the non-surgical group, 126, or about 27.75 per cent, showed evidence of nasal or sinus allergy. In the entire 700 cases, therefore, both surgical and non-surgical, 191, or approximately 27.3 per cent, were, according to my (Baum's) diagnosis, allergic."

Whether the incidence of allergic cases in rhinologic practice is on the increase or whether we are now more alert in recognizing them is something to be conjectured. The role of allergic factors in nasal and sinus conditions is now so prominent that even if the indications are positively surgical, the allergic aspect usually receives first consideration.[10] The decision whether to institute allergic treatment first and then operate, or to operate first, must rest with the individual rhinologist. The old theory that surgical intervention is altogether contraindicated in the presence of nasal allergy has, however, been exploded. Baum showed that allergic patients frequently have primary nasal involvement requiring correction by operation, the symptoms of which are accentuated by the allergic condition.

"Allergic manifestations often bring these patients to seek relief, which may be obtainable only by needed surgical intervention, in addition to treatment of the allergy."

This fact has not been sufficiently stressed in the past, nor has it been demonstrated why specific immunization therapy and nonspecific procedures frequently fail to produce more successful results. A recent study[11] revealed that after surgical correction of existing pathologic processes, specific or nonspecific treatment was more effective in affording patients relief from their allergic symptoms.

CAUSES OF FAILURES OF NASAL AND SINUS OPERATIONS

Reverting back to the theme of this presentation, let us now consider the causes of failures of nasal and sinus operations. Answers to this query in the questionnaire listed them in the following order:

(1) Incorrect diagnosis of the existing conditions;

(2) Failure to take account of allergic factors;

(3) Lack of recognition of the role of organic diseases;

(4) Hasty surgical intervention without adequate trial of non-surgical treatment;

(5) Ill-performed or incomplete operation;

(6) Inadequate postoperative management.

It is fully appreciated that there may be other causes of failures, but in a general way these have been judged as the most important.

(1) While it seems almost too elementary to discuss the importance of correct diagnosis, the large majority of rhinologists fear that this is a prominent cause of surgical failures. It is not difficult to understand that errors in diagnosis are possible, as the human element is involved, but the number of cases in which this shortcoming has occurred is far too large in the light of our present scientific advance. Care should be taken not to read in indications that do not exist. Every facility available should be utilized to arrive at an accurate diagnosis lest an improper or inadequate operation be performed.

(2) Baum's statement that it is startling to see the number of papers on diagnosis and surgical intervention in sinus disease in which even the barest mention of allergy is neglected needs little comment. It only amplifies the views of progressive rhinologists that obviously there are at present changing trends in otolaryngologic therapy.[12] Allergic factors must be duly evaluated in every case before surgery is advised or undertaken; otherwise therapeutic failure will be the rule rather than the exception.

(3) Organic diseases such as diabetes, syphilis and tuberculosis coexisting with rhinologic affections are the major entities whose influence must be properly evaluated to prognosticate the probable outcome of surgical intervention. Other diseases of lesser importance also have to be considered as the situation warrants. Not only should the organic disease itself be treated before

operation is performed, but the rhinologist should make certain that the condition has been arrested and that it will not be lighted up by surgical intervention. The urgency of operation should be weighed against the harm which may result from its performance in the presence of active organic disease.

(4) When a patient presents himself with a nasal or sinus complaint, it is usually possible, after a complete examination, to say whether surgical or non-surgical treatment is indicated. There are, however, so-called borderline cases, a number of which frequently responds to intensive non-surgical therapy. In a recent paper dealing with the management of nasal sinusitis, I[13] said:

> "While no hard and fast rules can be laid down, it seems reasonable to advocate a thorough trial of non-surgical methods when the situation is not critical and when no hazard will be added by the time element required. When the need for surgery is absolute, no other procedure should be considered solely on the ground that it is nonoperative in nature."

The rhinologist must exhaust every diagnostic resource before advising operation and in no instance should he be hasty in its performance if doubt exists as to the end result.

(5) Ill-performed nasal surgery falls in the same category as ill-advised nasal surgery. Ford[14] aptly pointed out that lack of standardized surgical procedure for definite pathologic entities should rank high as a definite factor in unsatisfactory experiences with nasal surgery, leading essentially to incomplete operations. It has often been said with reference to the faucial tonsils that an entire tonsil even if diseased is far less harmful than part of it. This implies a great deal for discussion, but its application here is apropos. Certainly an incomplete Caldwell-Luc operation may produce new symptoms which would not have to be dealt with had the procedure not been carried out. The symptoms from incomplete nasal and sinus operations are often more severe after than before surgical intervention.

When is an operation complete? This depends on the surgeon's regard for thoroughness which in turn is the reflection of his training and ability. Timidity rather than conservatism is the cause of many incomplete nasal and sinus operations. If the rhinologist considers himself competent to undertake the risk of surgery, he should be qualified to determine when he has completely eradicated or corrected the pathologic process for which operation was advised and undertaken. In the absence of other standards this is the sole criterion.

During the operation itself poor surgical technic and unfavorable reactions may lead to undesirable end results. Inadequate or unsatisfactory analgesia or uncontrollable bleeding sometimes interferes with the completeness with which the contemplated operation is to be performed. Incomplete procedures make for multiple sinus operations. Ill-performed nasal and sinus surgery actually means surgical mutilation of structures. While in the former the evidence is not visible, the symptoms soon lead the patient to realize that his original condition has been made worse. This occasional incident is in no small measure responsible for the fallacious views concerning rhinologic surgery[15] entertained by the medical profession as well as by the laity.

(6) Of the 154 rhinologists who responded to my questionnaire, 112 expressed the opinion that careless postoperative treatment was an important cause of poor end results in many operated patients. While occasionally this may be due to the indifference of the rhinologist, it not infrequently is attributable to a lack of cooperation on the part of the patient.

SUGGESTIONS FOR IMPROVED RESULTS AND PREVENTION OF FAILURES

From the facts already before us, what can we contribute in the way of suggestions that will improve results and prevent failures of nasal and sinus surgery? The following suggestions are offered:

(1) *Greater Accuracy in Diagnosis.*—Increased attention to exact diagnostics of nasal and sinus conditions will aid materially in securing better end results of operation. Aside from the customary procedures the use of radiopaques[16] and body section roentgenography[17] will often clarify and render certain an otherwise doubtful diagnosis. More care should be exercised in the interpretation of roentgen films correlating the history, clinical symptoms and findings in each individual case. Anatomic differences of the two sides of the face, a frequent source of diagnostic error, should always be borne in mind.

The diagnosis should embrace more than that involved in the rhinologic process. It should include a complete physical work-up of the patient as pointed out by McQuiston,[18] and others, and a comprehensive allergic study. It should also seriously consider the relation of endocrine dys-

function. In the past the latter has not been sufficiently stressed, although Cody, Jr.,[19] has shown that an infection of the paranasal sinuses occasionally results in an imbalance of the hormones of the affected ductless glands, with consequent development of endocrinism.

Due consideration of the potential relationship of organic and systemic disease merits special mention, although this phase has already been discussed. In this connection, it should be stated that a comprehensive diagnostic study must of necessity investigate also possible biochemical deficiencies as these have been shown to influence infection, retard resistance and otherwise hinder normal progress in the therapy of upper respiratory diseases.

In the final analysis, Williams and Mousel[20] point out, the fundamental requirement in the treatment of chronic sinusitis is a differential diagnosis accurate enough to prevent the application of formidable procedures to conditions in which they cannot logically be expected to produce any beneficial effect.

(2) *More Careful Selection of Patients.*—While I have already pointed out that this is undoubtedly one of the more prominent causes of poor end results of nasal and sinus surgery, I want to re-emphasize this point. The operation should be selected for the patient and not the patient for the operation. Nor should the operation so selected be depended upon in itself to produce the desired result. The patient may have to be subjected to additional treatment if a satisfactory end result is to be expected. Parkinson[21] emphasized this when he said that the reason for the frequent disappointment of nasal surgery lies not in faulty surgical technic, but in over-standardization of approach, or more specifically, in over-dependence on some one procedure.

"The surgery has not been designed specifically to meet the particular pathologic condition. A variety of pathologic entities contribute to nasal obstruction. Their correction requires a variety of procedures. Only thus may one correlate surgery to pathology."

(3) *Increased Attention to the Allergic Aspect.*—Hansel's[22] classical studies on allergy of the nose and paranasal sinuses have in no small measure contributed to a broader comprehension of the relation of this important phase to rhinologic surgery. A systematic preoperative allergic work-up of patients will often indicate the penalty for avoiding postoperative allergic management. Apart from the fact that our current appreciation of the significance of the allergic factor has markedly reduced the number of nasal and sinus operations being performed, our increasing knowledge of allergy is constantly shedding more light on a hitherto baffling problem. Since in the past a lack of proper consideration for the allergic factor has been demonstrated as a cause for many rhinologic surgical failures, the necessity of increased attention to the potential allergic aspect of all nasal and sinus conditions cannot be too strongly stressed.

(4) *More Rational Application of Surgery.*—This is a broad division of the subject because it embraces a number of factors. It must of necessity call attention to the avoidance of hasty surgical intervention, the ultimate application of surgical procedures which are adequate and which will completely eradicate or correct the existing pathologic process without regard to the numerous unrestricted classifications of conservative and radical procedures. Personal preferences for special operations should be sacrificed for the choice of one best suited not only to meet the clinical indications but also to correct anatomic and physiologic deficiencies. In other words, we should depart from our classic operative technics, if need be, and modify them in accordance with the present concepts of nasal physiology. This seems perfectly reasonable when we realize that the older procedures were devised without benefit of the present comprehensive knowledge of physiologic principles. Finally every effort should be made to correlate diagnostic findings with the pathologic changes shown by operation.

(5) *More Adequate Postoperative Care.*—Follow-up treatment should include not only attention to the operated nasal or sinus field, but also, as Parkinson has emphasized, correction of the diverse pathologic entities for which various remedies and procedures may be essential.

COMMENTS AND CONCLUSIONS

Two definite deductions can be made from the responses to my questionnaire: (1) The number of surgical operations now being performed on the nose and sinuses is on the decrease. (2) The pendulum has swung to a more conservative therapeutic approach.

Efforts to establish criteria which will enable one to offer a satisfactory prognosis have thus far failed because, as Jowett[23] has asserted:

"Impartial observations upon results of treatment are regrettably sparse."

Payne,[24] like myself and others, believe, more than it is realized, that unsuccessful surgical treatment may often be laid to overlooked allergic or endocrine factors. On the other hand, Faulkner[25] correctly points out that in many instances a favorable response is unlikely until pressure from local hypertrophies is relieved. The necessity of proper selection of cases for operation cannot be sufficiently stressed. I repeat that the operation should be selected for the patient and not the patient for the operation.

Pathologic processes should be corrected surgically to conserve normal function so far as it is possible. For example, we no longer extirpate the inferior turbinate to provide increased breathing space; nor do we perform a rhinologic operation without respect for its influence upon the ciliary mechanism. Septal resection strikingly shows the difference between purely mechanical and biologically sound procedures, in that the former are characterized by destruction, impairment or abolition of function, while the latter typify the surgical ideal of biologic conservation. It is these newer physiologic principles which render a departure from the older technics in rhinologic surgery so highly essential to improved end results.

SUMMARY

(1) This study revealed that the percentage of "cures" from rhinologic operations reported by 154 rhinologists closely approximates the percentage figures obtained by personal questioning of a comparatively large series of operated patients.

(2) While a favorable result from a rhinologic operation cannot always be anticipated, under proper circumstances the prognosis need not be speculative.

(3) Recent advances in anatomy, physiology and allergy have substantially modified the indications for rhinologic surgery.

(4) The causes of poor end results and failures of rhinologic operations are: (1) inaccurate diagnosis, (2) lack of consideration of allergic factor, (3) failure to appreciate the role of organic diseases, (4) hasty surgical intervention, (5) ill-performed or incomplete operative procedures, and (6) inadequate postoperative management.

(5) Suggestions for improved surgical results are: (1) more accurate diagnosis, (2) greater care in selection of patients for operation, (3) increased consideration of allergic aspect, (4) more rational application of surgical procedures based on newer physiologic concepts, and (5) more adequate postoperative management.

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DISCUSSION (*Abstract*)

Papers of Drs. Heitger and Hollender.

Dr. Bernard J. McMahon, St. Louis, Mo.—The difference between reversible and irreversible pathologic conditions should be more keenly appreciated. While it is difficult to look at the face of a sphenoid sinus,

for example, and try to determine accurately its future course, it is possible to arrive at a working conclusion if we have a knowledge of the significant basic pathologic changes in the mucosa of the nose which are caused by a background of pathology within the sinuses.

You may see intense hyperplasia and thickening of the epithelium which will not return to normal and metaplastic changes. There is also heavy infiltration of connective tissue, which is not reversible. The basis of pathologic changes within the sinuses and within a turbinate is the circulation. The fibrosis which ensues in chronic conditions is a result of the limitation of the circulation to that part. The absorption of bone and replacement by connective tissue does occur. The resulting changes are in the thickened vessels which supply the entire turbinate and supply the area of the sinus mucosa as well, causing irreparable or irreversible bone changes.

A picture may be presented that is similar to the previous one, but in the process of repair. The bone is regenerating. There is heteroplastic bone formation, islands of bone are formed in the connective tissue, where the connective tissue cells have retained their ability to resorb calcium and return to their original status of bone cells.

The bone and cartilage cells originate as connective tissue cells, and while this characteristic may be obtunded for a short time, it is re-established under the proper biochemical conditions, and the cell resumes its normal function and returns to its normal habitat, as it were.

Another picture illustrates the activity of osteoclasts as the bone is destroyed. The mononuclear and multinuclear types of osteoclasts may be shown. Bone of this type, after being destroyed, may be replaced by connective tissue which may or may not become calcified, or it may be entirely destroyed. This is a good example of irreversible pathology. I have a picture of a septum between two frontal sinuses in a dog. The same procedure, zinc sulphate ionization, was carried out on both sides. Excessive hyperostosis, with bone almost completely filling the sinus, occurred on one side, an irreversible pathologic condition, while the membrane returned to normal in the opposite sinus.

It is impossible to say which patient is going to show reversible and which irreversible pathologic changes following infection in the nose or paranasal sinuses.

By thinking in terms of the blood supply we can get some help in prognosis. If there is a turbinate or a surface that we can see, which shows hypertrophy alone, we can think more in terms of reversible pathology within a sinus. If it shows hyperplasia and changes indicative of connective tissue infiltration, we can think in terms of irreversible pathology deep in the sinus, as the blood vessels traverse the sinus wall and mucosa to supply that particular turbinate or adjacent mucosa. Blood vessels are thickened along their courses, the blood supply is limited in the tissue supplied, the venous return is interfered with, and acute disease goes on to chronic disease and fibrosis.

When we have deep bone pathology and interference with the nourishment of a sinus, no matter how completely we strip the mucosa of that sinus, that mucosa is not going to regenerate as normal mucosa and remain as such because it has not the nourishment to sustain it in a normal condition and it will probably revert to the type of mucosa that was in the sinus before the operation.

It therefore behooves us correctly to evaluate the degree of pathology within a sinus before subjecting a patient to sinus surgery. We will thus avoid much unnecessary surgery, cause fewer sinus neuroses, and incidentally bring greater credit to the true science of otolaryngology.

Dr. John J. Shea, Memphis, Tenn.—It is a very hard thing to control newspaper accounts of a medical meeting.

During the past year, of course, we all have had many patients consult us for immediate cure with a 5 per cent solution of sulfathiazole. While the Academy was in progress in Chicago, one of the papers quoted a very reliable man as saying that 90 per cent of sinuses were allergic.

Last year, weekly magazines carried the story of chlorophyl. Dr. Ridpath told me he had inquiries from all over America for some of the chlorophyl that a patient could put in his nose a few times to cure sinus disease.

One of the best ways of correcting this is to teach our own associates.

The local ear, nose and throat medical society is a very good teaching ground. If there were more of these, they would go far toward improving everybody's technic.

Sinus surgery has a place. There are children's sinuses that deserve to be drained. The literature in pediatrics during the last eight or ten years has gradually excluded the question of drainage of children's sinuses. When a child has an empyema of an antrum, it should be drained as in an adult.

Many good surgeons do not pay sufficient attention to their patients during convalescence.

Dr. Mercer G. Lynch, New Orleans, La.—In this day of complicated and intricate surgical technics, wholesale curative drugs and mechanical methods of treatment, one is apt to forget the basic sciences studied in medical school and, for the most part, left there upon completion of the course.

Much has been written about the handling of cases of polypoid degeneration, hyperplasia, hypertrophy and atrophy, but how many times do we stop to think of the fundamental processes taking place in order for these pathologic conditions to present themselves? Operations, treatments, technics, have been devised and always emphasize two thoughts: good ventilation and adequate drainage. To this should be added a return to normal physiology, because without this the former are inadequate.

If, in establishing good ventilation, too much tissue is removed, so that the mucous sheet of the nose is destroyed or seriously impaired, then we have failed, for infection will follow. If, in establishing good drainage, vasoconstrictors of high or alkaline pH are used, the nasal mucous membrane is further irritated and the return to normal of a slightly acid status is postponed, defeating our purpose. During sleep the nasal secretions are slightly more acid, therefore rest is essential. External heat has been shown to produce a slightly acid condition and further to help a return to normal.

Dr. Edley H. Jones, Vicksburg, Miss.—These statistics are a challenge to our profession. It does not seem reasonable to advocate surgery for the relief of nonemergency conditions unless better than 50 per cent of

cures can be obtained, yet it appears that this situation exists. In particular, I cannot understand the poor results reported following submucous resection. I regret time has not permitted a survey of my own cases, but I believe I could report a higher percentage of cures. In this particular operation we should have universally good results.

Allergy is now receiving a great deal of attention, possibly too much attention. While we should not neglect allergic conditions, we should not over-emphasize them. No surgical procedures should be instituted during the acute stages of allergic conditions; in the advanced chronic stages, surgery may be necessary before the allergic symptoms will respond to treatment.

I have only a hazy conception of the influence of endocrine factors upon nasal physiology. In my search for a better understanding I have encountered many glittering generalities, but little definite information.

I think it was the elder Skillern who, years ago, said that if we would treat our cases as carefully before surgery as after surgery, we would not have to operate so often.

It is only by careful, analytical, unbiased studies, like this essay, that we can approach the ultimate goal of perfection.

Dr. J. Hallock Moore, Huntington, W. Va.—The essayist, even though his tables cover the sinuses in general, limits his remarks chiefly to the antrum. Dr. W. C. Bowers calls this the keystone of the sinus arch; and well it is, for unless the antrum is healthy, the adjacent sinuses are or will become diseased. However, in my experience, more poor surgery is performed upon the ethmoid and frontal than upon the antrum.

I consider allergy in every patient before even thinking of surgery. About six years ago I was impressed by a number of cases of vasomotor rhinitis, and even hypertrophic rhinitis in women who had had extensive pelvic surgery. These responded promptly to the necessary endocrine substances of which the surgery had deprived them. In the hypertrophic cases, after satisfactory endocrine therapy, very little nasal surgery of a plastic nature was necessary.

Dr. Hollender has offered many excellent criteria for the prevention and care of these conditions to which I should like to add only two suggestions. First, do not abandon conservative measures for surgery until you are satisfied that they are inadequate. Sometimes this takes months; and chemotherapy, locally, as well as generally, should be given a thorough trial. Remember that the physiology of the sinus after operation is always interfered with. Many times conservative measures restore in part the normal function of the sinus membranes to a greater degree than does surgery. The second suggestion is that after radical surgery do not either undertreat or overtreat the sinus. Irrigations after operation are nearly universally contraindicated, and substituted in their place is aspiration via a suitable cannula through the enlarged sinus hiatus.

Dr. French K. Hansel, St. Louis, Mo.—The statistical data on the end results of nasal and sinus surgery presented by Dr. Hollender indicate that the percentage of cures and good clinical results is far from satisfactory. He has pointed out the chief causes of failure and has made some timely suggestions as to how better results may be obtained.

Among the causes of failure, incorrect diagnosis, lack of consideration of allergic factors and hasty surgical intervention appear to be the most important.

In the nasal cases submucous resection is the most commonly instituted surgical procedure. When a septal deflection is the only cause of nasal obstruction, the results of the operation are highly satisfactory.

Although a submucous resection is not infrequently indicated in nasal allergy, a good result may not be obtained unless the allergy is adequately treated. In our experience, practically all the failures from this operation have occurred in those instances in which an associated nasal allergy was not recognized or was not properly managed.

With a few exceptions it is generally conceded today that allergy is the principal cause of nasal polyposis. Unilateral polyposis may represent malignancy or the benign myxomatous type of polyposis which usually originates in the antrum. It not infrequently occurs in young children. Allergic polyposis is rare in children before the age of puberty.

In allergic nasal polyposis almost everyone follows the practice of immediate removal. In our practice immediate removal is the exception rather than the rule. We follow this plan because we are attempting to classify our cases into those for immediate and those for later removal. We are especially interested in determining the incidence and degree of recession under allergic management alone. It has been noted that in those cases with marked nasal symptoms and highly edematous polyps recurrence may quickly follow immediate removal. And yet these are the cases in which the most striking recession takes place under adequate allergic management. We have observed all degrees of recession from zero to 100 per cent. During marked acute allergic exacerbations or during acute infections the polyposis is always temporarily increased.

The degree of recession of polyposis is dependent upon the amount of fibrous infiltration and the response to allergic management. With good allergic control recession is therefore proportional to the degree of fibrosis. The more edematous, the more improvement; the more fibrous, the less improvement. Very fibrous polyps, therefore, almost always have to be removed.

The degree of pathologic change and infection in the paranasal sinuses in allergy is usually most pronounced in cases of associated nasal polyposis. In these instances we have followed the rule of instituting surgical interference on the sinuses only after the nasal polyposis has been controlled. Marked improvement in the sinus pathology often occurs when this is accomplished. Conservative rather than radical interference is therefore the rule. In any event, surgical intervention in allergic cases should be secondary in importance to allergic management if satisfactory end results are to be obtained.

As Dr. Hollender has emphasized, accurate diagnosis appears to be of primary importance. In each and every case there should be a correlation and evaluation of the following factors: (1) the clinical history; (2) the nasal changes; (3) the cytology of the secretions; (4) the x-ray examination; (5) the bacteriologic findings; and (6) the histopathology.

Nasal cases should be definitely classified into the allergic and the non-allergic. The sinus cases should be grouped as infectious, allergic or combined allergic and infectious.

I feel that a great deal of emphasis should be placed

upon the value of routine cytologic examinations of the nasal and sinus secretions in differential diagnosis and as an indicator of acute, subacute or chronic infection complicating allergy.

Every otolaryngologist should be able to interpret or evaluate the significance of various cytologic pictures as well as the rhinoscopic, bacteriologic and x-ray findings. In view of these newer developments, therefore, any discussion on nasal and sinus diseases today that does not include the cytologic findings must be considered as incomplete.

DEHYDRATION AND EDEMA*

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Deficiency of body water, that is, dehydration, and edema, an excess of it, are related though opposite conditions. Effort to repair one may produce the other; they may coexist.

Extracellular fluid lies in two compartments. The interstitial fluid, in the larger of these, is capable of great reduction or even greater expansion and defends the blood plasma against critical changes of volume. This defense is not without hazard in both directions; dehydration is the more obvious and may be precipitate; edema, on the other hand, often produces damage before it is apparent.

In health the stability of ionic structure and, consequently, of volume of extracellular fluid is insured by thirst and man's instinctive desire for salt. Failure of one of many physiologic functions may disturb this equilibrium.

Of prime importance is the ability of the kidney selectively to excrete or retain electrolytes and water. This serves to keep constant the electrolyte pattern of the extracellular fluid, our primeval heritage. The sodium ion, entirely extracellular and constituting 92 per cent of total base, is consequently the one irreplaceable electrolyte. Its concentration determines the osmotic pressure and, thereby, the volume of extracellular fluid.

Of hardly less importance is a mechanically intact circulatory system with plasma proteins adequate to the maintenance of colloid osmotic pressure. The heart supplies the required gradient of capillary pressure; in the opposite direction, colloid osmotic or oncotic pressure is supplied by plasma proteins at normal levels. A diminishing gradient of capillary pressure, which first exceeds and then falls beneath the attracting colloid pressure within the capillary, effects interchange of fluid in the tissue spaces. Impermeability of the capillary wall to the protein molecule prevents the escape of protein and consequent lowering of effective colloid osmotic pressure.

Abnormalities of endocrine function may disturb fluid balance by influencing sodium and consequently water retention.

The sodium ion, therefore, by virtue of its irreplaceable position in the electrolyte structure, plays a dominant role in the pathogenesis of dehydration and edema. In contrast with other factors difficult to remedy, it can be supplied readily when deficient and withheld when present in excess. The dehydrated patient cannot retain water in the face of a deficiency of sodium ion. In the edematous subject there is with insignificant exception always a relative excess of this electrolyte.

Certain inferences as to treatment may be drawn. Dehydration is a constant clinical problem, too often unheeded when apparent though often not easily recognized. Prevention is of primary concern when the intake of food or water is restricted from any cause or when there is loss of base from excessive sweating or when there is loss of digestive tract secretions by vomiting, diarrhea or fistula. Likewise in certain febrile diseases, notably in lobar pneumonia, loss of base with parallel loss of water produces circulatory collapse or medical shock, and its disturbing sequelae, among them abdominal distention.

In the home there are added difficulties in the treatment and especially in the prevention of dehydration. If, instead of "forcing fluid," salt is supplied, thirst will demand fluid. Perhaps the broths and beef tea of a generation past, though of no food value, by reason of their salt content served a useful purpose in producing thirst. Even more effective now is sodium chloride given in enteric-coated tablets. Failing sufficient intake by mouth, which is, of course, the method of choice, salt solution and other fluids are being generally used parenterally in the home.

In endocrine disturbances such as uncontrolled diabetes mellitus and Addison's disease, dehydration constantly occurs. In the polyuria of

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chronic nephritis it may occur and is often precipitated by salt restriction.

Regardless of the specific therapy of the disease dehydration needs to be treated effectively by only one method, namely, the use of combinations of salt solution and of 5 per cent glucose solution; the former for restoration of volume of the extracellular fluid and repair of all defects of ionic structure (except for ketosis); the latter, 5 per cent glucose solution, to present fluid to the kidney, enabling it correctly to control the materials supplied by the former and for the oxidation of ketone bodies. This is Gamble's idea and he maintains that these two solutions fulfill all requirements except one, very rare in adults, in which immediate relief of acidosis is imperative. In that case the lactate-Ringer solution of Hartman should be used.

Difficult laboratory tests of the electrolyte status are often used. The clinical acumen of the experienced observer with the ever-present concept of the possibility of the occurrence of dehydration is the ultimate resource both in recognizing the condition and in determining the end point of treatment. Scanty urine, particularly when of high specific gravity, usually implies dehydration. The converse is not true; dehydration may exist with polyuria.

In contrast with the relatively simple mechanism of dehydration, that is, the parallel loss of base and of water, is the complex pathogenesis of edema. It may consist simply of reversal of the mechanism of dehydration, that is, of excessive retention of base and consequently of water. In its more complex forms excess of base still plays an important part. Low plasma protein, cardiac failure, capillary defects and endocrine factors in varying proportions supply one or another clinical pattern of edema. In all of these the onset is insidious, a corollary of the great expansibility of the interstitial space. (Fluid in amount equal to 10 per cent of the weight of the individual may be present before pitting edema occurs.)

Plasma albumin, on account of its relatively small molecule, is the only protein which contributes significantly to colloid osmotic pressure, and this in terms of its actual level and not of its ratio to plasma globulin. The role of this protein in the prevention of edema has already been discussed.

A low level of serum albumin may result from depletion either by failure of replenishment, as by food, or by excessive loss, by repeated hemorrhage, for example. As the result of prolonged low levels of serum albumin or from other causes or, indeed, as a primary affair, another and sometimes irreversible defect may become operative, namely, loss of albumin synthesizing power.

Restoration of an adequate level of serum albumin, which is essential to permanent relief of edema from this cause, is difficult. Even under the most favorable circumstances of adequate diet, restoration is slow. Once the power of synthesis is lost, albumin cannot be permanently restored. In either case temporary increase in colloid osmotic pressure by the mere increment of serum albumin in added plasma may be effective in producing diuresis. This is particularly true when it is used to potentiate diuretics. Added plasma, although it may restore adequate serum albumin only temporarily, potentiates diuretics effectively, provided base is sufficiently restricted. The following case illustrates this factor occurring in cardiac edema.

A woman of 52, with a blood pressure of 220/140 in severe congestive cardiac failure, orthopneic, with massive edema even to the hands, on salt and fluid restriction, digitalis, ammonium chloride and "mercupurin" failed to improve and in twelve days in the hospital had a total fluid intake slightly greater than her output of urine. The serum albumin was 2.8 per cent. After 250 c. c. of plasma was given, 2 c. c. of "mercupurin," the dose she had been getting previously, was followed in 24 hours by the output of 4,300 c. c. of urine. This and two similar additional injections of plasma, with other drugs as before, gave an output of urine in 18 days of 45 liters, 21 liters in excess of her intake of fluid. The edema disappeared, cardiac function was well restored, she was able to lie flat, the blood pressure fell to 140/90, and the serum albumin was 3.6 per cent.

The normally functioning kidney protects the organism effectively against great excess of base. The undernourished patient, however, with low plasma protein level, develops edema readily when an excess of salt is given. After operation this may result in edema which, though "insensible," may interfere with wound healing and even cause disruption. Occurring about the stoma of a newly formed anastomosis it may cause obstruction. After operation upon the central nervous system such edema is equally disturbing.

Salt being restricted, whole blood or plasma, plain or concentrated, or the relatively cheap bovine plasma, provided antigenic hazards are eliminated, is an effective direct remedy for this. Casein antolysate, acacia, the latter discredited by many on account of possible liver damage, and more recently ascitic fluid and pectin have been used to restore the low colloid

osmotic pressure of the plasma. Recent work by Brown and Muether points to the possibility of reversing hepatic cell damage by the administration of choline, resulting in raising of serum albumin level with relief of ascites and edema. Ravdin and his associates use a peptone hydrolysate by an oro-jejunal tube or by rectum. It is futile to hope by alimentary means to restore the plasma protein level in anticipation of operation.

Such conditions as massive recurrent hemorrhage, extensive burns and exfoliative dermatitis produce circulatory collapse with capillary damage, great protein loss and hemoconcentration. This differs from the dehydration of so-called medical shock where the blood is also concentrated, but in which the plasma proteins are at a high level. In the conditions described salt solution alone results in still greater loss of blood volume into the tissue spaces and increase of shock. Plasma which raises the protein level is an emergency resource of great value.

Nephrosis in its pure form is a rare disease in the adult, at least. The problem of treatment of edema in this disease is essentially that of low plasma protein. While sodium ion concentration in the interstitial fluid is actually lower than normal, the edema is responsive to restriction of sodium intake. The reason for this is obscure. Instances of diuresis after sodium ion administration, as bicarbonate, have been reported by Albright and Bauer. Plasma is useful, but has been called a luxury since the effect is temporary.

Contrary to our ideas of ten or fifteen years ago, the edema of congestive cardiac failure is peculiarly complex. Elevation of capillary pressure from cardiac failure, low colloid osmotic pressure from low serum albumin, often from loss of synthesizing power, as in the case cited, capillary damage from anoxia, retention of base and many other less defined factors present in varying proportions, make up the clinical picture.

Consideration of the varied pathogenesis involved points the way to effective remedy; the digitalis group for cardiac failure, restriction of sodium in the diet with mercurial and other diuretics, and with plasma if the serum albumin level is inadequate. The latter too often results from unwise restriction of protein in the diet.

Restriction of fluid intake is not necessary provided sodium is restricted. It is not the quantity of fluid intake, but the quantity of base in the tissue spaces which determines the amount of fluid retained in them. Fluid in excess of this satisfies thirst and is to the advantage of kidney function.

Schroeder, at the Rockefeller Institute, recently reduced the sodium chloride intake in 23 patients to 1 gram daily in severe cardiac failure, in some of them for a short time to 0.5 gram. Unlimited fluid, as much as 3,000 c. c. daily, for two weeks or more, produced diuresis and sometimes actually initiated increased excretion of chlorides and consequent loss of weight. Water intoxication resulted in two cases where there was renal insufficiency.

Obscure in its precise etiology, though less so in its mechanism, is edema from the damaged capillary wall. It is there that the lesion seems to occur in acute nephritis, permitting escape of plasma protein with consequent edema. That this is associated with generalized subcutaneous edema has long been recognized. Pulmonary edema, possibly due to the same capillary defect and without cardiac failure, has been described recently.

In acute nephritis the lowered plasma albumin is probably a corollary of the degree and extent of capillary injury with escape of protein through the vessel wall and tends to regress spontaneously when the acute stage of the disease has subsided. An excess of dietary protein is useless in such a situation and may be harmful. Relief of edema is not the primary concern in acute nephritis, though increase of edema may be limited by restriction of salt, water being given only as desired.

Generally the edema of chronic nephritis, unless complicated by the nephrotic syndrome, is of cardiac origin. Such a kidney may function poorly when edema occurs. Restriction of fluid places the kidney at the added disadvantage of lack of water. Mercurial diuretics should not be used and acidifying salts should be used only with great caution in such cases. Water given freely by mouth or subcutaneously may often produce satisfactory diuresis in this situation.

The influence upon electrolyte balance of the natural and the synthetic hormones of the gonad and of the embryologically similar adrenal cortex has been emphasized repeatedly. The salt and water retention characteristic of the week preceding menstruation is thought to

contribute to the ordinary discomforts of the menstrual period. They have been reported relieved by acidifying diuretics with restriction of salt. This retention may also mediate various clinical phenomena. Stokes suggests that the monthly relapses of acne and acneiform eruptions may depend upon inflammatory manifestations in the skin incident to retention of water at this time. Cardiac failure is another of these phenomena.

This is illustrated by a woman of 48 seen with rheumatic mitral stenosis who had little or no evidence of cardiac failure and a normal erythrocyte sedimentation rate. Only in the week preceding each menstruation did she have considerable cardiac failure with edema and dyspnea, both on effort and in nocturnal paroxysms.

Increased intracranial pressure with choked disk and other findings simulating cerebral tumor have been described within the last month by McCullough.

SUMMARY

An attempt has been made to outline the various factors involved in the causation of dehydration and edema, fairly simple in the case of the former, much more complex in the latter. It is well established, and to be stressed, that sodium ion concentration determines the water content of the tissue spaces.

The early detection of dehydration as a clinical duty involving suspicion of its existence, knowledge of conditions leading to its development and close observation of the patient has been emphasized. Certain laboratory procedures, when available, are useful, but of secondary importance. Correction of the condition in its simple form calls for the liberal use of salt and water. In more complex conditions, such as repeated hemorrhage, extensive burns and exfoliative dermatitis, transfusion of whole blood or plasma must be resorted to.

The treatment of edema calls for analysis of all the factors involved in the individual case. Restriction of sodium intake is a necessary adjunct in the management of all edema. The use of other therapeutic measures such as acidifying salts, mercurial and xanthine diuretics and digitalis and transfusions of whole blood, plasma and other substances must depend upon the underlying anatomic and physiologic derangement. The synergistic effect of plasma with a mercurial diuretic when plasma protein is low, particularly in cardiac edema, is stressed.

BLOOD PRESSURE STUDIES IN PATIENTS UNDERGOING CONVULSIVE THERAPY*

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Early reports[1] [2] on the use of metrazol to produce convulsions as a treatment for psychiatric disorders name cardiovascular disease as a contraindication. This judgment, considered on *a priori* grounds, is immediately appealing, since, aside from any specific effects of metrazol directly on the cardiovascular system, the convulsive activity induced evidently constitutes severe exercise. The muscular exertion that patients undergo during the seizure impressses the observer as probably at least equal to any effort that man could voluntarily make. It is not surprising then that early investigators[3] hesitated to use metrazol therapy on any but young patients.

An increase in blood pressure of from 20 to 60 mm. of mercury as a result of the metrazol is reported by some early observers.[4] Others[5] record a moderate mean rise in systolic blood pressure when measured shortly after the seizure. (Before the seizure mean systolic pressure was 146, shortly afterwards, 160.) A few minutes later, however, the mean systolic pressure had risen markedly (to 197).

Since it is impossible to measure blood pressures accurately during an actual convulsion by ordinary clinical means, the writers felt that a study by intra-arterial manometer would be worth while. Observations of subarachnoid hemorrhage in monkeys[6] and of cerebral hemorrhages in mice[7] treated with metrazol suggest the possibility of such damage in patients and lend especial interest to the determination of what really occurs to the blood pressure during induced seizures.

In order to diminish the severity of muscular

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contraction in convulsive therapy, spinal anesthesia,[8] curare[9] and beta-erythroidin hydrochloride[10] have been used. In the present clinical experiment arterial pressures were recorded from patients receiving these premedications, since it seemed useful to learn how pressures might be affected by such combinations. Before the present experiment was begun, in the regular clinical use of curare and beta-erythroidin to produce asthenia prior to convulsive therapy, we occasionally noted cardiovascular reactions that seemed to indicate the need of further study. In a series of 116 convulsive reactions after premedication with curare and of 14 after premedication with beta-erythroidin only the following instances were noted.

Case 1.—A 24-year-old white woman with manic depressive psychosis and with no physical signs of any other disorder developed shock after receiving 2.3 c. c. of curare and (2 minutes later) 3.3 c. c. of metrazol. She did not have a convulsion, but two minutes after the metrazol was injected the skin became clammy and cold and the pulse impalpable. Blood pressure at this moment could not be obtained by the usual method. One minute later it was 80/40. Prostigmine was then administered and recovery occurred in a few minutes. Curare administered to the same patient on eight other occasions was not followed by any signs of shock.

Case 2.—A 17-year-old colored woman with schizophrenia and with no physical signs of any other disorder had a marked fall of blood pressure after receiving beta-erythroidin hydrochloride. Six c. c. of a 10 per cent solution was slowly administered. At this point the head could not be raised; so the injection was terminated. The hand grip was still strong (approximately 70 to 80 per cent normal). Since 15 c. c. of such a solution has been reported as "generally sufficient for the average 60 kilogram patient, the range being from 1.2 to 2.2 grams,"[10] this dose would hardly be regarded as excessive. The patient, however, showed signs of shock and the blood pressure fell to 65/40. The signs of shock subsided spontaneously after six minutes and metrazol was given, producing a successful and uneventful convulsion. Beta-erythroidin was administered to the same patient on six other occasions, once in a dose of 11 c. c. (10 per cent solution) without signs of shock appearing.

Our observations with the intra-arterial manometer were made on six psychotic patients receiving convulsive treatment by metrazol and one receiving convulsive treatment by electric shock. Blood pressures were recorded continuously by means of a needle inserted into the femoral artery and attached to a leaden pipe containing citrate, which was connected with the manometer. The manometer consisted essentially of a thin metal diaphragm whose minute excursions were magnified by a beam of light reflected from a small mirror attached to the diaphragm.[11] [12] Intragastric pressures were also recorded continuously by means of a similar manometer attached to a rubber balloon by a nasal tube inserted through the patient's nose.

In patients receiving metrazol without premedication the arterial pressure rose regularly during the convulsion, the increase sometimes being as great as 120 mm. of mercury systolic and 95 mm. diastolic. In most of the patients studied the arterial pressure fell immediately after the convulsion below the preinjection level (approximate average reduction 40/20 mm. of mercury). Within a minute after the cessation of the convulsion the blood pressure regularly rose to, and

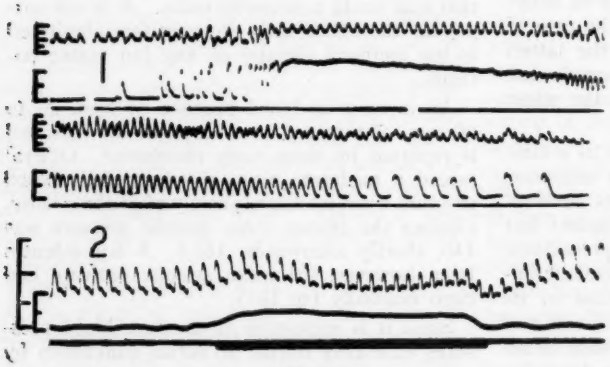

Fig. 1

(1) Metrazol without premedication. (2) Strain.

The top record (1) shows the blood pressure curve (above) and the intragastric pressure curve (below) above a base line on which regular breaks indicate intervals of ten seconds. The first break indicates an injection of metrazol. There was no premedication. The clonic-tonic-clonic sequence of the convulsion, which begins at the second break in the base line, can be followed by the variations in the intragastric pressure curve, the jagged outline being a reflection of the clonic movement, the smooth plateau representing the tonic phase. Scales at the left of the curves, graduated so that each interval represents 50 mm. of mercury, enable one to follow the pressure changes. It may be noted that the blood pressure, 145/95 before metrazol, rises to 245/155 during the tonic convulsion and runs from 245/155 to 100/60 during the clonic convulsion. The intragastric pressure rises from zero prior to the seizure to 130 mm. of mercury during the tonic phases and varies between 20 and 95 mm. of mercury during the clonic. The middle curve is a continuation of the same record.

The bottom record (2) shows the blood pressure and intragastric pressure curves in a subject straining. The period of the strain is indicated by the thickened portion of the base line. The blood pressure, 110/65 prior to the strain, rises to 140/100 soon after the strain begins, falls to 100/68 before the strain ends, then, after the strain has ceased, undergoes a secondary rise to 200/100. The intragastric pressure rises from approximately zero to 55 during the strain, but remains at zero during the secondary rise following the strain. (Courtesy of the *Journal of Pharmacology and Experimental Therapeutics.*)

usually slightly above, the preinjection level. Anoxia must be considered as a probable factor in this slight secondary rise, though the effect of metrazol, which excites both sympathetic and parasympathetic systems, may in some patients play a part.

The rise in arterial pressure mentioned above in patients given metrazol alone was regularly accompanied by a comparable increase in intragastric pressure. This intragastric pressure for practical purposes may be considered as approximately representative of the thoracico-abdominal pressure. Since changes in the thoracico-abdominal pressure are promptly transmitted to the cerebrospinal fluid,[12] it may be inferred that the net pressure changes, the pressure changes to which the walls of the cerebral vessels (*Fig. 2, top record*), were subjected, were practically negligible. In some instances the blood pressure continues to rise as the seizure proceeds despite a static, or even a diminishing, intragastric pressure. In such instances a definite, but usually a moderate, increase in net pressure occurs. This slow rise may be the result of anoxia.

When curare and beta-erythroidin hydrochloride were given prior to the administration of metrazol no significant changes in blood pressure were usually recorded prior to the subsequent injection of metrazol. During the weak convulsion that occurred when metrazol was given after these premedications, the rise in blood pressure was usually much less than when metrazol alone was given. The slight increase recorded was in general proportionate to the degree of muscular activity occurring, very little elvation of blood pressure being noted when asthenia was maximal. As one would expect, the increase in intragastric pressure was also less and was inversely proportional to the degree of asthenia.

High spinal anesthesia (T_3 to T_1) prior to the injection of metrazol greatly minimized the convulsive activity and prevented the increase in intra-thoracico-abdominal pressure and blood pressure which usually occurs after metrazol. In addition it prevented sympathetic stimulation which usually follows metrazol and left the full manifestations of the parasympathetic effect unopposed. This resulted in a fall of blood pressure and usually a bradycardia. In a patient who had high spinal anesthesia this effect was sufficient to produce cardiac arrest for 17 seconds. Spinal anesthesia limited to lower levels, and curtailing muscular activity less markedly, only diminished the rise of blood pressure.

The patient who with high spinal anesthesia suffered cardiac arrest was given atropine (1 mg.) in another test with spinal anesthesia prior to metrazol. The bradycardia was greatly reduced and no arrest occurred. In other patients premedicated with atropine and not given spinal anesthesia the sympathetic effect of the metrazol was unopposed and there was a rise in the

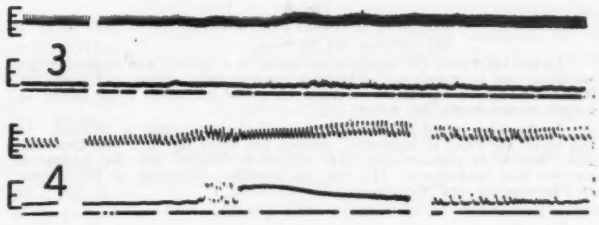

Fig. 2

Metrazol After Curare.

The top record (3) shows the blood pressure (above) and the intragastric pressure (below) before and after curare, which was injected at the first break in the base line. Metrazol was then injected (just prior to the first slight upward wave in the intragastric pressure curve). There is no significant pressure change after the curare and before the metrazol. The blood pressure rise during the convulsion is much diminished (from 150/90 to 195/125 and the rise of intragastric pressure is approximately 25 mm. of mercury. It may be noted that the blood pressure continues to rise slowly as the seizure proceeds, even though the rise in intragastric pressure diminishes. This results in a moderate increase in net pressure.

The bottom record shows the curves of a patient who received a smaller and less effective dose of curare before metrazol. There is a rise in blood pressure between the administration of curare and the administration of metrazol (160/95 to 170/100), which is probably caused by the patient's apprehension. During the seizure the blood pressure rises at first to 200/150, while the intragastric pressure rises 75 mm. of mercury. After the intragastric pressure has fallen to 50 mm. of mercury the blood pressure in this instance continues to rise, reaching a level of 250/180.

It may be noted that this gives an increase in net pressure (30/30) rise that is not accounted for by the increase in intragastric pressure, but is perhaps due to a preponderance, in this instance, of sympathetic action. (Courtesy of the *Journal of Pharmacology and Experimental Therapeutics.*)

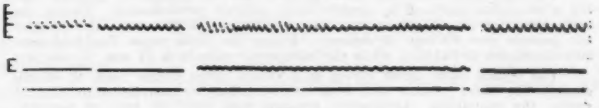

Fig. 3

Beta-erythroidin and Metrazol.

When beta-erythroidin is given (first break in base line) an insignificant diminution in blood pressure is noted. During the convulsion (after second break) that followed the injection of metrazol the pressure changes are again insignificant. Thirty seconds after the seizure has ended (after the last break in the base line) the pressures are essentially the same as before treatment.

net blood pressure of 80/25 mm. of mercury. No such net rise as this occurred without premedication with atropine nor did any other patient show a comparable net blood pressure increase.

In electric shock without premedication a marked rise in blood pressure was noted and a considerable rise in intragastric pressure. The rises in blood pressure were, however, greater than the rise in intragastric pressure, leaving a net increase that can probably be taken to represent an additional, though not a marked stress, on the walls of the cerebral and coronary vessels. Further observations on a large number of patients would be necessary before an opinion could be justified as to whether electric shock regularly produces a greater increase in the net blood pressure than convulsions from metrazol.

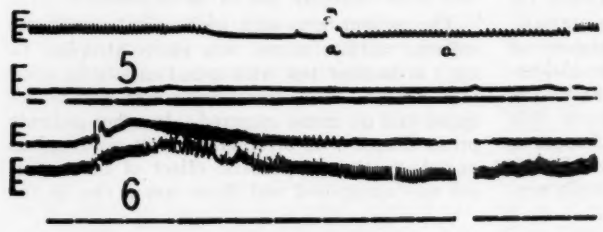

Fig. 4
(5) Spinal Anesthesia and Metrazol
(6) Atropine and Metrazol

In the top record (5) pressures are shown in a patient who received spinal anesthesia and later metrazol. The blood pressure falls. There is a slight but insignificant rise in intragastric pressure. A period of cardiac arrest lasting 17 seconds occurs during the seizure.

In the lower record (6) atropine (1 mg.) was given prior to metrazol. In this record the curve of intragastric pressure lies above the curve of blood pressure. The blood pressure rises from 120/80 to 250/180 and the intragastric pressure rises approximates 120 mm. of mercury. (Courtesy of the *Journal of Pharmacology and Experimental Therapeutics.*)

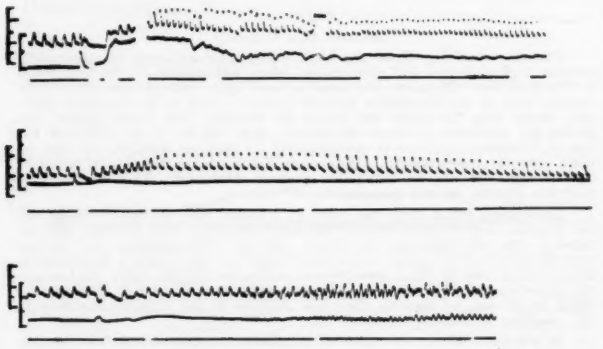

Fig. 5
Electric Shock.

The top curve shows the blood pressure and the intragastric pressure during a convulsion produced by electric shock without premedication. During the tonic phase the blood pressure rises from 140/90 to 235/165, while the intragastric pressure rises 90 mm. of mercury. During the clonic phase the blood pressure diminishes to 185/135, while the intragastric pressure is 35 mm. of mercury.

The middle curve shows curves in a patient given curare prior to electric shock. The blood pressure rises from 145/90 before the convulsion to 205/125 during the convulsion. Intragastric pressure rises only 15 mm. of mercury. This results in a net increase in blood pressure of 45/20.

The bottom record shows a convulsion produced by electric shock in a patient who had been given spinal anesthesia. Blood pressure after the spinal anesthesia but before the convulsion was 105/55 (a definite decrease from the patient's normal blood pressure of 120/85). During the convulsion a further fall occurred to 80/40 mm. of mercury. The intragastric pressure changes were insignificant.

DISCUSSION

In therapeutic convulsions produced by metrazol and electric shock a marked increase in blood pressure occurred. This increase (sometimes more than 100 mm. of mercury) is greater than the increases described in strenuous exertion.[13] The increase is apparently the result of a concomitant rise in the intra-thoracico-abdominal pressure which tends to prevent it from acting as a stress on the visceral vessels or the cerebral vessels, since this increase of pressure is transmitted also to the cerebrospinal fluid.[12]

The pressure changes accompanying and following strains[12] are unlike those in therapeutic convulsions. There is no marked secondary rise of intra-arterial pressure after the relaxation from convulsions has taken place. The secondary rise after the cessation of prolonged strain is probably caused by an influx of blood dammed up in the large veins and the skeletal muscles by increased intra-thoracico-abdominal pressure during the strain. After the strain this passes into the thorax, where it increases the output of the heart enough to give a temporary rise in blood pressure that might be sufficient to embarrass a weakened cardiovascular system. In the convulsion, on the contrary, the clonic movements continue to pump blood on to the heart despite the augmented intra-thoracico-abdominal pressure and no such damming up occurs.

Previous work with dogs has shown that a marked increase of

blood pressure occurs in convulsions produced by metrazol and that this increase far exceeds the simultaneous increase in intra-thoracico-abdominal pressure, the net increase in pressure to which the cerebral vessels and visceral vessels are subjected being considerable.[14] In man our observations suggest that, on the contrary, the net increase in blood pressure is usually negligible, the recorded rise in blood pressure being chiefly a reflection of the increase in intra-thoracico-abdominal pressure caused by the muscular contractions.

These observations on patients who received convulsive therapy without premedication are borne out by observations on patients whose skeletal muscles had been effectively paralyzed by curare, beta-erythroidin and spinal anesthesia. Under this condition the rise in blood pressure was minimal and in general varied inversely with the degree of muscular paralysis.

No noticeable effect, except in the two instances cited, was observed from the administration of curare or beta-erythroidin prior to the administration of metrazol and after the administration of metrazol there was no effect except what could be accounted for by the decrease in the violence of muscular activity. This suggests that the two instances cited above in which shock occurred, once with curare and once with beta-erythroidin, were exceptional. The fact that it did occur in these instances, however, emphasizes its possible occurrence as well as the advisability of having at hand means to combat it.

The occurrence of cardiac arrest in a patient who received metrazol after spinal anesthesia indicates that spinal anesthesia, which has been advised as a means to prevent vertebral fractures,[8] may lead to dangerous complications. This is not to be regularly expected, for other patients similarly treated did not develop cardiac arrest. In the same patient, apparently an unusually vagotonic person, the administration of atropine prevented this manifestation.

Although in dogs the sympathetic stimulation of metrazol apparently predominates over the parasympathetic stimulation, in human beings these effects usually mingle and approximately balance each other. Our observations with the intra-arterial manometer suggest, however, that in vagotonic people, on the one hand, and in sympatheticotonic people, on the other, this balance sometimes is imperfect, allowing one effect or the other to predominate.

Our observations, as yet limited, suggest that in electric shock therapy the net increase in blood pressure and the stress to which cerebral and visceral vessels are subjected may be greater than in metrazol. Such net increases as we have observed do not, however, appear marked.

CONCLUSIONS

(1) A marked increase in blood pressure occurs during convulsive therapy.

(2) A concomitant increase in intra-thoracico-abdominal pressure also occurs during the convulsion and, in human beings, usually approximates the increase in blood pressure.

(3) The increase in intra-thoracico-abdominal pressure is transmitted promptly to the cerebrospinal fluid so that in most instances little net increase in blood pressure or stress on the cerebral vessels occurs.

(4) On some occasions a slow rise of blood pressure continues during the seizure without a continued increase in intra-thoracico-abdominal pressure. This results in some increase in net pressure. This increase, usually slight or moderate, may be a result of anoxia.

(5) In the limited observations of this experiment the net increase of blood pressure with electric shock therapy tended to be greater than in metrazol therapy.

(6) During the observations with the intra-arterial manometer no significant changes in blood pressure were noted after the administration of curare alone or of beta-erythroidin alone. During seizures induced after premedication with these drugs, no significant pressure changes were noted except those apparently due to the diminished violence of muscular activity.

After spinal anesthesia metrazol in some instances caused a marked fall of blood pressure. In one instance cardiac arrest of 17 seconds' duration occurred.*

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DISCUSSION (*Abstract*)

Dr. H. D. Allen, Jr., Milledgeville, Ga.—Dr. Cleckley is to be congratulated upon being able to get help from the physiologist, pharmacologist and anesthesiologist in testing his observations upon the convulsive reaction.

His method of observing the blood pressure causes me some confusion. The small needle into the femoral artery should, it seems to me, measure the pressure of fluid motion which, according to Bernoulli's law, is inversely proportional to the rate of flow, whereas, blood pressure is stress on the arterial wall when the flow is stopped. As a farmer or soil conservationist rather than a physicist, I know that as water flows over a low place in a terrace, the terrace breaks in, not out. From a mathematical standpoint the curve of the top of the wings of an airplane represents the lifting of power of the plane as air has to travel faster over the curve and sucks the plane up. We are all, of course, familiar with the simple suction pump which is only a constricted pipe with a hole at the point of maximum constriction.

My own blood pressure studies in connection with shock therapy have been on patients with known high blood pressure and all three types (insulin, metrazol, electric) have made the pressure go higher immediately after any convulsive manifestations. These observations have been few, as I have rather welcomed contraindications to convulsive shock therapy. While I have given shock therapy rather freely, I still feel towards it somewhat as I do when talking to a neurologist or psychiatrist, a certain sense of uneasiness. Taking a note from another essayist, I believe that my giving of shock therapy has caused a certain hyperplasia of my own circle of Willis. I do, however, get some added courage from this study of why we do not get more accidents to the circulatory system and if I do have a circulatory accident (in a patient I am treating, not myself), it may well be either an explosion or implosion, depending upon the compensation between peripheral stress and rate of fluid motion.

Dr. Sydney B. Maughs, St. Louis, Mo.—The two cases presented in which there were reactions to the preliminary drugs, such as curare, are well worth noting. We must always be on the alert for those individuals who are apt to react thus and be prepared to combat it. But this is an extremely subtle problem, for one gathers from Dr. Cleckley's material that there are no ways in which we may anticipate such reactions. High spinal anesthesia, as a premedication, appears not without danger. The implication that the balance between the sympathetic and parasympathetic systems is disturbed by preliminary medication interested me. I should like to hear Dr. Cleckley comment upon this further.

The results of this study demonstrated that the rise in blood pressure following metrazol therapy is negligible and that any such rise is further minimized by premedication. While the number of cases on which the evidence is based is small, it is a beginning in the right direction and the case material should be augmented. If these findings are borne out in a large number of cases, then many patients, formerly denied a trial with metrazol because of age and cardiovascular disease, may enjoy its advantages. I should like to ask Dr. Cleckley whether there was any particular selection of cases and into what age group they fell.

The reported instance of a fairly marked increase in blood pressure following electric shock is significant. More evidence along this line would be desirable. It suggests to me that we should be extremely cautious in accepting newer types of shock therapy simply because they appear less hazardous as far as known complications are concerned. There may well be other complications, such as marked rises in blood pressure, which render the newer type as hazardous as the old.

An interesting side-light of this paper is the relation of experimental studies on animals to humans. Too often have the results of animal experiments been erroneously applied to man. From Dr. Cleckley's study of the effect of metrazol on the blood pressure of dogs one might have concluded that the same effect was to be expected in man, namely: a marked increase. But he goes further and demonstrates that this is not true and that, in fact, almost the contrary is true. Perhaps it would be wise if we were to re-evaluate in this light our ideas about cerebral damage resulting from metrazol, much of which was arrived at through work on animals.

Dr. David C. Wilson, Charlottesville, Va.—Dr. Cleckley, I should like to ask, what are the highest spinal fluid pressures that you did obtain?

Dr. Cleckley.—About 270 over 115 to 120.

Dr. Wilson.—That is by the direct method?

Dr. Cleckley.—That is gross pressure without trying to subtract the intragastric pressure.

Dr. Lawrence F. Woolley, Towson, Md.—We have attempted at our clinic to do some studies of the blood pressure, using external pressures. It seems to me that we find a tremendous variability in the response. At times following electric shock we have seen immediate falls of blood pressure; at times tremendous rises. We have seen systolic pressures go from around 180 to 340 millimeters of mercury pressure externally in patients who were deeply enough curarized to permit us to take the blood pressure. What those pressures might amount to if they were not curarized I have no idea at all.

I presume that with sufficient muscular contraction you get perhaps even a shutting off of arterial flow or

complete stoppage, due to capillary blocking in muscles and tissues. The arteries of the brain, of course, are not supported by any tissue that contracts. They have the same support they always have had, a closed box with the fluid medium surrounding them, and these terrific changes in pressures are transmitted to the walls of the vessels. Perhaps the cerebrospinal fluid pressure does increase immediately and simultaneously with that, but it certainly seems a very precarious mechanism to rely upon.

Another surprising thing to me is the fact that in the clonic phases, where you have an alteration between profound contraction and profound relaxation, we do not see a greater variability of the swing of the blood pressure curve. One wonders about that.

Dr. Wilson.—Your feeling is that the intragastric pressure through the interspinal pressure acts as a buffer, you might say, to the rise in arterial pressure.

Dr. Woolley.—Not a perfect buffer, but somewhat.

Dr. Cleckley (closing).—The patients upon whom we made these studies of arterial pressure, of course, constitute too small a group for anyone to make a final conclusion or for anyone to become blandly confident that there is no danger from increased stress on the cerebral vessels or other vessels. It is perhaps even too small a group for one to gain much comfort in a situation which, as Dr. Woolley said, one feels is precarious when one is conducting therapy. Our observations do, however, indicate that there is a marked damping of the stress to which the vessels might be subjected.

I think we have little need to doubt that the increase in intraspinal pressure is prompt. Whether it is instantaneous in terms of such measurements as speed of light, I would not dare say, and I doubt seriously that there is absolute synchronization, but previous studies have shown, with the same intra-arterial manometer and a parallel graph of the intraspinal pressure, a very close correlation which, of course, we have all observed grossly when having a patient cough while the needle is in the subarachnoid space for lumbar puncture.

We cannot dismiss arterial disease as a contraindication to therapy with metrazol and to therapy with electric shock. Studies of this sort, if continued on a larger number of cases, may give sufficient evidence to reassure us.

High spinal anesthesia, I think, as Dr. Maughs mentioned, should be considered as constituting a real additional danger in a treatment which, of course, is dangerous enough. If spinal anesthesia is used, atropine should be administered first.

The imperfect balance between the parasympathetic system stimulation and the sypmpathetic system stimulation probably occurs not infrequently, depending in part upon the constitution of the patient. We noted that the vagotonic patient who had cardiac arrest after spinal anesthesia and metrazol showed with metrazol alone a preponderance of parasympathetic effect as compared with other patients.

The cases were not selected by any special criteria except that they were psychotic patients and the age group into which they fell was from 20 to 35. We were a little chary about taking for this study patients who were very old or who had any known somatic disorder.

I do not think we can say that electric shock therapy regularly brings about a greater net increase than metrazol, but it did show a slightly greater increase in this very small group of cases.

The variability in blood pressure records of patients undergoing convulsive therapy which Dr. Woolley stressed is extremely important. Our series is too small to suggest all the variation which probably occurs. Even in our small series we noted such variations as cardiovascular arrest for seventeen seconds in a patient, while others treated exactly the same way did not show anything similar.

Blood pressures of 340 mm. of mercury, as mentioned by Dr. Woolley, did not occur in this small series. We may, however, find them if we continue to run tests of this sort.

THE DISTRIBUTION OF PHYSICIANS IN LOUISIANA WITH SPECIAL REFERENCE TO THOSE IN PRIVATE PRACTICE*

By B. I. BURNS, PHD., M.D.†
New Orleans, Louisiana

INTRODUCTION

Lack of uniform distribution of physicians has been widely discussed as a potent factor contributing to inadequate medical care. That such maldistribution does exist cannot be denied. It is also true, however, that no logical means of overcoming it has been devised and the question may be raised as to whether even an ideal distribution of available medical personnel would provide adequate medical care on the basis of a ratio of one physician to each unit of 1,000 population.

Considerable alarm has been expressed by members of the medical profession and others at the overproduction of doctors. Hyman[1] has dealt with the criticism directed at the medical schools for supposedly aggravating a bad situation by continuing to graduate too many physicians. In so doing he presented the problem in the ten Southern states in a somewhat different light from that in which it has been viewed in other regions. He also criticized the suggested solution of increasing the period of premedical training and coincidentally increasing the cost of medical education. He offers sound argument, supported by statistical studies, that enrollment in Southern medical schools should

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†Dean, School of Medicine, Louisiana State University.

be maintained at the present level and reasons logically that any increase in the cost of medical education would tend to increase concentration of doctors in cities and decrease the number in more sparsely populated areas.

In another publication,[2] elaborating on this same theme, Hyman called attention to factors which discourage the recent medical graduates from locating in communities in which their services are most needed. Such communities possess social handicaps as well as professional ones. Davison[3] pointed to the small town and rural community as offering an opportunity to the young practitioner and, likewise, analyzed the situation as to lack of professional facilities and social advantages.

Study of the figures presented by Hyman and Davison makes it readily apparent that there is a paucity of physicians in the more sparsely populated areas in the Southern states. A detailed study of the situation in Louisiana reveals not only a poor distribution but an actual scarcity of physicians in the State as a whole. When all factors are taken into consideration the picture is such that one may question whether the problem in the Southern states is not much more serious than the reports of Hyman and Davison indicate.

This report is based upon a study which was originally conceived as a means of interpreting for the authorities of Louisiana State University the relationship of our own school to the problem of medical care in Louisiana. It is presented here to call attention to certain elements of the problem commonly overlooked rather than because of an assumed general interest in the factual matter offered. Many factors cannot be considered because of the difficulty or impossibility of securing data. It is to be hoped, however, that more complete statistics will be collected for the entire country and that those offered here may at least suggest certain leads in the direction of a more complete analysis.

SOURCE OF DATA*

The data were compiled from the 1940 Directory published by the Louisiana State Board of Medical Examiners, the 1940 American Medical Directory, the 1940 United States Census figures for the parishes and most of the small towns of the State, and the 1930 United States Census figures for a few small towns and for the negro population of the State, for which the 1940 census figures are not yet available. Thus the figures presented are not entirely accurate even for the time at which the data were collected. Furthermore, the distribution of physicians changes rapidly and, even had the latest census figures been available, certain discrepancies could not have been avoided.

In considering this report certain facts should be borne in mind. First, the data were drawn from directories which were published prior to the calling of large numbers of physicians to active military service and therefore reflect the normal distribution. Second, an effort has been made to feature the ratio of physicians in active practice to the population. Third, since resident physicians in hospitals are engaged in active practice, because hospital patients, whether charity or private, constitute a part of the population, a distinction must be drawn between "active practice" and "private practice" in interpreting the statistics.

The data tabulated for each physician include his location, his age, the school from which he graduated, his years of practice and the type of practice. Separate data were compiled for the white and for the colored physicians and for the white and for the colored population in each locality. No detailed information was obtained on such matters as facilities for medical practice, per capita financial income, nor on many other factors which vitally concern the whole problem. Much information which would be helpful is unobtainable or intangible and much of it is dependent upon a type of study for which facilities were not available.

Discrepancies between our figures and those obtained from other sources is apparent from a study of *Table 1*. For example, between 1936 and 1940 the population of the State increased more than 10 per cent, whereas the total number of physicians increased 17 per cent in the same period. If, however, only the physicians in active practice are considered, the increase for the four-year period is but 3 per cent. Since the data on which the 1931 and 1936 figures are based are not available to me, I cannot account for the discrepancy. Since the population figures were taken from the United States census reports in both instances, however, the variation must result from the figures for the total number of physicians, and it seems likely that the 1931 and 1936 data do not include resident hospital

*I am indebted to Miss Elizabeth McFetridge, formerly Editor of publications for the medical faculty, for most of the extremely arduous task of collecting and compiling the data on which this report is based.

COMPARISON OF NUMBER OF PHYSICIANS AND POPULATION PER PHYSICIAN IN LOUISIANA IN 1931, 1936 AND 1940*

(Figures for 1931 and 1936 from J.A.M.A., Vol. 110, No. 11, p. 143B. Those for 1940 are our own.)

	Population	Total No. Physicians	No. in Active Practice	Population per Physician
1931	2,099,000	2,076	2,021	1,039
1936	2,121,000	2,135	2,045	1,037
1940	2,363,880	2,514	2,107*	1,122†

*Includes resident physicians in hospitals.

†If resident physicians are not considered, this figure becomes 1,357.

Table 1

physicians, whereas we have included them in the 1940 data. This comparison serves to illustrate the need for more detailed analysis of the problem with the consideration of factors which have often been overlooked.

In *Table 2* is shown the number of physicians in the State who are engaged in activities other than private practice. Of this group, however, the 365 physicians listed as still serving internships and residencies may be considered as being engaged in active practice. Whether these resident physicians are commonly considered in arriving at physician-population ratios is not evident. I have seen no report in which it was clear that the physicians engaged in other activities listed in *Table 2* were eliminated from consideration in establishing the ratio. It should also be pointed out that the number of resident physicians in the State has been markedly increased in recent years and that a large portion of the percentage increase of physicians in active practice is thus accounted for.

RATIO OF PHYSICIANS TO POPULATION IN LOUISIANA

The total number of physicians in the State is 2,514 and the population of the State is 2,363,880. Thus, as shown in *Table 3*, there exists a ratio of one physician to 940 population. If, however, the physicians engaged in activities such as public health, teaching, and so on, and retired physicians are eliminated from the picture and the number in active practice only is considered (2,107), including resident hospital physicians, the ratio becomes 1 to 1,122. If the 365 resident hospital physicians are eliminated and only the 1,742 physicians in private practice considered, a ratio of 1 to 1,357 is obtained.

Negro physicians, of whom there are 97 in active practice in the State, are related to the negro population as 1 to 7,800, approximately. Thus it is evident that the contribution of negro physicians to medical care is by no means proportionate to the problem represented by the negro population. Statistics indicate that many of these negro physicians are in the upper age brackets and that the majority of them graduated from schools which are no longer in existence. These facts clearly indicate that the major responsibility for the medical care of the negro population rests with the white physicians of the State.

FACTORS AFFECTING DISTRIBUTION

The great majority of white physicians practicing in Louisiana are graduates of Southern schools. It is interesting to note, however, that 16 per cent of the practicing white physicians and

ACTIVITY OF PHYSICIANS NOT IN PRIVATE PRACTICE

Still serving internships and residencies	365
Full-time teachers	77
Retired (one negro)	76
Army and CCC (one negro)	27
Public health	56
Institutional	40
Veterans' Administration	27
Quarantine and labor department	7

Table 2

RATIO PHYSICIANS TO POPULATION IN LOUISIANA

Population of State	2,363,880
Total number of physicians in State	2,514
$\frac{\text{Physicians}}{\text{Population}} = \frac{1}{940}$	
White population of State	1,587,554
Negro population of State	776,326
Number white physicians	2,416
Number negro physicians	99
Number physicians in private practice	1,742
White	1,644
Negro	97
Number physicians in active practice (including resident physicians)	2,107
$\frac{\text{Physicians}}{\text{Population}} = \frac{1}{1122}$	
$\frac{\text{White physicians}}{\text{Population}} = \frac{1}{1176}$	

Table 3

82 per cent of the colored physicians are graduates of schools which are no longer in existence or which are unaccredited. It is common knowledge that schools which went out of existence did so because of inability to maintain an acceptable standard of medical education. Graduates of these non-existent or unaccredited schools are usually older men practicing in the rural communities of the State. In one parish there is not a single graduate of an accredited medical school and not a single physician under 40 years of age. These statements are not intended to disparage the type of medical practice in any given locality nor to reflect on any individual physician. It is a well-known fact that many graduates of schools which are no longer accredited have conducted and many are still conducting a high type of medical practice. The fact remains that the data do suggest that the qualitative as well as the quantitative level of medical practice in certain localities could profitably be elevated.

The age of the physicians in a community has a definite bearing on the consideration of the problem of medical care. The average age of physicians for the whole State is 50.9 years and the average years of practice is 25.5. The age range is from 23 to 92 years. In 17 of the 64 parishes there are no physicians under 30 years of age and in 9 others there are none under 40 years of age. The youngest average age in any parish is 40 years and the oldest average age is 62 years (in 2 parishes). The average age of physicians in private practice is, in 30 parishes, from 40 to 49 years; in 28 parishes it is from 50 to 59 years, and in 6 parishes it is from 60 to 62 years. In the 8 parishes in which large cities or towns are located there are 77 physicians in private practice under 30 years of age, of whom 41 are located in New Orleans. In these same parishes there are 250 between 30 and 40 years of age, of whom 167 are located in New Orleans. In the 56 parishes which contain only small towns and rural communities there are only 66 physicians in private practice under 30 years of age and only 136 between 30 and 40 years of age.

A detailed study of the distribution of physicians of Louisiana in relation to age and years of practice makes it apparent that young physicians are inclined to concentrate in the large towns and cities and to avoid the rural communities and small towns. The age of physicians practicing in these communities must militate against adequate medical care, since many of them are in the sixties, seventies, and even eighties.

The ratio of physicians to population in parishes in which large cities are located is greater than 1:1,000. In Orleans Parish (New Orleans) it is 1:835, in Ouchita Parish (Monroe) it is 1:883, and in Caddo Parish (Shreveport) it is 1:939. In 22 parishes the ratio is 1:1,500+, in 14 parishes it is 1:2,000+, in 8 parishes it is 1:2,500+, and in 6 parishes it is 1:3,000+. Thus if the ratio of 1:1,000 is accepted as a minimum one for adequate medical care, there is an actual dearth of physicians in 50 of the 64 parishes in the State. Davison[3] presents in tabular form the rank of each of the ten Southern states on the basis of "their need for and ability to support medical service." In this respect Louisiana ranks tenth. Accordingly the discussion of the problem based on statistics for Louisiana may be general for all Southern states.

DISCUSSION

It is evident from the data presented here that adequate medical care does not exist throughout the greater part of Louisiana and that the inadequacy is due to an actual shortage of physicians as well as to poor distribution. There may be some question as to the acceptance of the 1:1,000 ratio as a basis for judging the degree of scarcity of physicians. Just how this ratio was established is not apparent to me. Obviously the number of patients a physician may properly care for depends on many factors and must be quite variable.

The statement that a shortage of doctors exists in Louisiana is definitely supported by the statistics. When all factors are considered, including the uneven distribution in relation to population, the gravity of the situation promises to increase unless definite steps are taken to correct present trends.

Hyman stated that the ratio of physician to population in the large cities of Tennessee is 1:500. In New Orleans it is 1:835 and in other large cities of the State slightly greater. The assertion that such a ratio indicated an oversupply of physicians demands support. One rarely observes a recent graduate of an accredited medical school who is not able to establish a practice of sufficient proportions to maintain a standard of living which compares favorably with that of individuals in other professional pursuits. On the other hand, many physicians appear to be attempting to care for a volume of

practice which by its very size must militate against adequate medical care for their patients. Davison's statement that

> "Medicine is probably the only field today in which a well educated graduate is sure of making a living and also of having security if he carries disability, life and old age insurance,"

would seem to be easily supported.

The faulty distribution of physicians is evidently based on concentration in the cities. It does not seem reasonable, as Hyman suggests, that many physicians are likely to submit to privation in the city while more sparsely populated communities are in need of their services except for some reason of a personal nature. Rather it seems likely that most of the physicians who concentrate in the cities fall into one of two classes. (1) Those who have been able to establish themselves promptly after entering practice. (2) Those who are not financially dependent on a practice for a livelihood.

The individual recent graduate in medicine who is financially dependent on income from his profession would as a rule be expected to be more likely to locate in the small town or rural community. For this reason every possible encouragement should be given to such individuals who are competent to pursue the study of medicine. Much can be done in this direction by a circumspect admissions committee. It has been shown that a considerable percentage of recent graduates from small towns and rural communities return to those same localities to practice. That this tendency should be recognized by the selection of qualified candidates for admission to the medical school from areas where doctors are needed and encouraged on the part of the communities in question by institution of all possible methods of improving facilities for medical practice should be evident.

It is to be hoped that the objectives of modern medical education are not too far out of line. Perhaps they should be examined critically, however, in the light of recognized defects in general medical care. Our educational program has been criticized as leading to too high a degree of specialization and it may not be amiss to reflect on the reason for it.

Modern hospitals in which our clinical teaching is done are organized on a specialization basis. Economic efficiency demands it. Our teaching is largely in the hands of highly specialized physicians. Immediately on entering a hospital a patient is routed to or through specialty departments. One of the great advantages claimed for hospital practice is that it facilitates the obtaining of specialists' opinion and treatment. It follows that training of medical students is naturally directed by the influence of specialization. Too little attempt is made to stimulate the undergraduate to solve his clinical problems without immediate resort to the refined facilities with which he has been trained. The result is that graduates of medicine who have completed an internship in an accredited hospital have very little notion as to how a medical practice may be conducted with the use of only the admittedly inadequate facilities which they will have available in the small town or rural community.

Criticism should always be constructive, but no panacea in the form of one complete solution of this problem can be offered. It is primarily a problem for clinical staffs. It seems that something could be accomplished by a better organization of teaching in the outpatient clinic. Most clinical teachers prefer to teach at the operating table or at the bedside. The individual who willingly and enthusiastically assumes responsibility for outpatient teaching assignments is a rarity. Too much emphasis is placed upon the number of beds which should be available to a medical school and too little upon the number, type, and method of handling outpatients. Surely no one will question the statement that the clinical conditions seen in the outpatient clinic constitute the bulk of practice of, at least, the young practitioner. But quackery thrives on the prostitution of the commonplace ailments with which reputable members of the medical profession have failed to concern themselves.

In general the defects of any educational system may be laid at the door of the teachers themselves. I have found very few teachers, and no good ones, willing to dispute this statement. Medical faculties, I believe, are representative of the very highest type teachers if judged on the basis of their ability to present their subject and their enthusiasm for it. This opinion is supported in part, at least, by the large number of busy practitioners of medicine on every medical school faculty who devote a considerable proportion of each day to the instruction of medical students for little or no monetary consideration.

Notwithstanding the high standard of instruction in medical schools, there is a suggestion in present day problems in medical care that perhaps there may be something lacking in the atti-

tude and even in the training of our medical teachers. Our faculties are made up of highly trained specialists who have no direct interest in nor thorough knowledge of the conditions to be met in a rural or small town practice. Most of them would contribute more effectively to the solution of the problem we are discussing if they could be placed in intimate contact with such a practice as a means of improving their training for the teaching of medical students. Possibly one worthwhile experiment might be either to select a few country practitioners for our faculties or to devise some means of assigning certain of our present teachers to small town or rural community practice for a time.

Suggestions that the oversupply of physicians in certain communities be corrected by increase in the years of training are untimely and seem to me to be completely illogical. Certainly such a measure would increase the cost of medical education and, as Hyman points out, would tend to increase the concentration in cities rather than decrease it. Scholastic standards in the medical schools are, I believe, high enough for the present. In some instances we may have been overzealous in this direction. In so far as the premedical course is concerned, my own observation is that the standard of scholastic achievement is low in many universities and colleges in all parts of the country in which I have had an opportunity to study the problem. Here, as in the medical school, teaching could profitably be improved. Many students who possess average mental ability are permitted to complete the premedical course with grades qualifying them for admission to the medical school, but without having had the training necessary to equip them for successful performance in medical courses.

Many young men in rural communities and small towns who are endowed with the mental ability to become physicians have failed because of inadequate public school and college training. This is more true of students from these sparsely populated communities than of those from the cities because public school standards are often low in the small town and rural localities.

Quite a number of qualified prospective students in Louisiana, and no doubt as many in other Southern states, are financially unable to attend college at all and many more find it impossible to finance a medical education. Practically all of them are from communities in which doctors are needed and would return to those communities to practice. There should be no attempt to provide a medical education for the "poor boy" merely as a matter of charity to him, but every means of encouraging him should be resorted to if he is or can be qualified. It is probable that all qualified candidates for medicine in the South who are able to finance a medical education are being admitted to medical school. More encouragement to enter the medical field should be offered to young men, beginning during the public school years.

Most of us fear the consequences of any form of subsidization. Nevertheless, some rational and righteous form of providing funds for the medical education of promising young men who will enter small town or rural practice should be possible and should be attempted in the Southern states. Above all, any such scheme should be under the absolute control of the medical schools or the university and free of any sort of political influence. Such an attack on the problem is admittedly difficult and dangerous, but the urgency of the situation warrants its trial.

Concern has been manifested for the danger of concentration of doctors in cities encouraging socialized medicine. Certainly this is a real cause for alarm, but no more so than lack of an adequate number of physicians in other localities. We have elements of this evil in certain respects already. The situation in Louisiana and throughout the Southern states at present is a ripe one for real regimentation of medical practice.

The whole problem of medical care is one with which the medical schools should actively concern themselves. Some attack is going to be made on it by some agency and unless Southern medical schools by concerted action devise and direct a solution the right one is unlikely to be found. We, as medical faculties, may be too prone to concentrate our attention upon high standards of performance alone with the result that we forget that our chief responsibility is really to the general population rather than to the students with whose training we are charged.

SUMMARY

(1) Inadequate medical care in small town and rural communities in Louisiana promises to reach crisis proportions within one or two decades unless definite steps are taken to correct present tendencies. The situation in this State is probably fairly typical of that in all of the ten Southern states.

(2) The problem is not alone or chiefly one of poor distribution. There is an actual shortage of physicians in the State.

(3) Complete solution of the problem calls for an attack beginning with public school training and extending through the premedical and medical years.

(4) Much can be accomplished by the selection of candidates for admission to the medical school with a view to their return to small town and rural communities.

(5) Some modification of the type of instruction offered in medical schools is suggested as a means of preparing students for practice in sparsely populated areas. Successful alteration of medical teaching in this direction depends upon a changed attitude and some special training of the medical faculty.

(6) Some means should be found to make it possible for any qualified candidate or prospective candidate from a community in which a physician is needed to finance a medical education even to the point of risking the admitted dangers of subsidizing his medical training.

(7) Regimentation of medical practice is a very real danger as a result of too few doctors in some areas and too many in others.

(8) Southern medical schools should make a concerted effort to direct attention to the problem of adequate medical care and should lead in its solution.

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DISCUSSION (*Abstract*)

Dr. Robert U. Patterson, Oklahoma City, Okla.—I know that every one of the deans present particularly, and no doubt some of the hospital superintendents, have had a great deal of concern during the past year and two months since the selective draft took effect as to just what they were going to do to help the Government obtain physicians to take care of the soldiers and sailors of the armed forces. In Oklahoma, we had some trouble at the start, but practically none for the last six months. The local draft boards here are thoroughly oriented and understand that medical students must be permitted to complete their education. If that were not permitted, we should very shortly have a very small number of doctors coming out of medical schools and the situation would become progressively more and more serious each year.

Recently, the point has been brought out that deferments can no longer be given in the case of junior and senior medical students unless they agree to take a commission in the medical administrative corps of the Army or corresponding service in the Navy while they are students. That means that those men are expected immediately to apply for commissions in the medical administrative corps, which is not a professional group, as you know, for the purpose of placing them under the direct control of the Surgeon General of the Army or the Surgeon General of the Navy, as the case may be, so that the Selective Service will not call upon those men as they will already be in the service, under the aegis or protection of the surgeon generals of the respective armed services.

Dr. Lahey last night spoke of the great need for physicians for the Army and the Navy, and of the complacency of the American people in general with respect to what is going on in the world outside of our country, and he applied that to the medical profession also. Medical students are deferred in order that they may complete their medical educations, including at least one year of internship in an approved hospital, and such privilege is given to them for the good of the country as well as themselves. They certainly have a moral obligation when they are deferred in order to get an education and some hospital training, to offer themselves to the military and naval services up to the extent that the demand requires.

Dr. Lahey told us last night that the Army and Navy right now need over 3,000 physicians in addition to the number now in both services. There are many physicians each year who die or become superannuated, or who are taking intern and resident training in hospitals and not available; so that and other attritions must be met by about 5,100 or 5,200 physicians who are graduated each year from our medical schools. You can see that it is not even a narrow margin. We are going to be short if we meet the military and naval demand with the number of physicians available in the country. That means that the civilian population will be affected as they were in the last war; they are going to feel the pinch.

Our students, when they graduate, feel they are all going to be Oslers and Halsteads and important medical persons of that kind. Therefore, they do not like to be delayed or deterred from their goal, which is to prepare themselves in many instances in some special branch of medicine. That is not going to be possible. They must realize that they must lay aside their personal plans and their aspirations for the time being for the sake of their country. Many men of my own school have gone into the military and naval services and have written me complaining that they were most interested in eye or in ear, nose and throat, or in gynecology or whatnot, and they were not doing that work in the Army or in the Navy.

At least forty to fifty per cent of those men who go into the services will have to serve definitely with troops in the field. A medical officer is just as much a soldier or sailor as anybody else in the Army or in the Navy. He has military or naval duties as well as professional ones. The fact that he has a knowledge of medicine, though the principal reason, is not the only one that makes him valuable in the military or naval services.

In the last World War we had only three surgeons to a regiment with a small detachment of thirty or forty men who were expected to do all of the work in the field with an advancing regiment in action. The

casualties, you know, even in the last war, were very high. The British lost so many medical officers and so many of their R.A.M.C. personnel that in 1918 they appealed to the United States for physicians and were sent a thousand, who served with the British forces in the field. That request was occasioned by the fact that they had many casualties. Even in our own Army in the last war, of the twelve or more branches that served longest overseas, the infantry, the cavalry, field artillery, corps of engineers, medical department, ordnance department, and so on, the medical department stood fifth in percentage of casualties among officers and enlisted men. That is in what was called a noncombatant service. In our own Army since 1918 we raised the regimental medical detachment from three officers to eight, and from about thirty to forty men to something like ninety, which now constitutes the complement for a medical detachment of a regiment. They are there for the purpose of giving immediate attention to the men so that the men themselves will know that they have an adequate complement of trained physicians and enlisted men whose business it is to look out for them. Of course, that has a very great effect on morale.

The medical officer must know strictly military drill if he is going to fit into the team with which he has to work. Hospital duties are only a part of a medical officer's duties. Organized medical troops are essential in the service of evacuation and must be filled by the younger men.

How long the doctors are going to be needed nobody knows. We were told that the medical reserve commissions which were given upon graduation would call for one year of internship, and then the men would be subject to at least another four years of service if needed. Of course, if his services are not needed, he would be discharged as soon as the forces are reduced. He had better count, however, on a possible five years from the time he graduates from medical school. Uncle Sam may need them all that time. The Government will agree to let them have one year's hospital training and the other four years they are going to serve with the colors, either with troops actually in the field or in some of the numerous hospitals of the Army and Navy.

Medical students who are able-bodied who do not apply for commissions may find themselves subject to the draft and may have the unpleasant experience of toting a rifle for three or four months until the Government, through its long chain of red tape, finally picks them out and tenders them a commission. When it has been found that a doctor is in the ranks, if he is a graduate of an approved school he will be given a commission just as soon as the necessary proceedings can be gone through to give him one.

Dr. Franklin E. Walton, St. Louis, Mo.—I should like to mention a detail that has been utilized in the Washington University School of Medicine at the present time. Dr. Leon Bromberg, one of the early residents on the medical service of the Barnes Hospital, is the present head of the local examining board. The clinic building of the Medical School has been designated as the place for physical examinations and, on Thursday nights, Dr. Bromberg has from 25 to 200 selectees present for examination. A complete physical examination of this number of candidates, along with the accompanying laboratory work, makes this a tremendous undertaking which must be completed in several hours. It has been somewhat difficult to get enough physicians to examine the selectees and thus clear the clinic of these several hundred men in less than three or four hours.

For the past two months we have been utilizing groups of our senior students in conjunction with the examining physicians. These students check over the selectees and run the urinalyses and other laboratory tests that are required. When positive findings are called to the attention of members of the examining board they are checked, and as a result it is possible to move these selectees much more rapidly; and in addition the students have the advantage of seeing many normal and abnormal individuals.

Our students have entered into this project on a purely voluntary basis, although they do receive credit from the department of internal medicine of Washington University toward their elective ward work in this particular field.

Dr. M. E. Lapham, New Orleans, La.—At the meeting of the Association of American Medical Colleges in Richmond a few days ago, some of you may remember that a statement was made concerning the high incidence of medical students who did not qualify for reserve officerships because of physical defects. This year at Tulane we have examined all of our freshman students within the first week after registration and have found a very large number of abnormalities, many of which can be relieved relatively easily. It is important for us not only to find the physically defective medical students, but to do something about correcting the defects so there will be a greater number of them who can qualify for medical military service. Of course, we are placing ourselves in the position of curing students to expose them to death in the event of war, but, after all, we are also making our medical military defense stronger by giving healthy medical men to the service. We have also volunteered to examine all of the engineering students in the university with the same idea in mind, because there is a rather high incidence of engineering students, as well, who do not qualify for military service by reason of physical conditions.

Dr. Lombard Kelly, Augusta, Ga.—We require all of our applicants for admission to the first-year class to appear for personal interviews some time from January until March, and to stand a rigorous physical examination, including examination of the eyes, ears, nose and throat.

We also, during the fall, send out the members of our third and fourth year classes to various branches of the university system where they assist in examining newly enrolled students. We have sixteen branches in the university system, and of course the largest of these is in Athens, where the School of Arts and Sciences, the Schools of Journalism, Commerce, Law, Pharmacy, Agriculture, are located, the Georgia School of Technology in Atlanta, and various normal schools and experiment stations are situated. For a number of years, now, we have been holding these examinations in the various units, or in a large percentage of them, and the university examiner in Athens has been correlating the findings that have been obtained by the various men who are in charge of these examinations.

The students in the School of Medicine are examined during the year; that is, of course, the second and third and fourth year students, because the first year students have already been examined prior to admission; and then at the time of the opening of school the Department of Tuberculosis examines all of the stu-

dents, takes skin tests, and where it is indicated carries on the examination to its final stages of fluoroscopy or the taking of flat plates where necessary.

I agree with what was said by Dr. Lapham in regard to the finding that numbers of graduates in medicine are not suitable for Army service. It would be an excellent idea to intensify our efforts in the medical schools to see that as many of our students as possible are put into first-class physical condition by the time of graduation.

Dr. Stuart Graves, Tuscaloosa, Ala.—Dr. Lahey emphasized the fact that the public in general is confused. Not every citizen is clear in his own mind as to how great the need is. If there were some way that the acuteness of the need could be emphasized and made clear to medical students, it would help clarify the situation very much.

We have had a very happy experience with the local boards of the Selective Service System in our State. We have not had a single man in medical school inducted, or a single man who was a premedical school student and had been accepted since December for the freshman class the following year. Not only that, every man who held an R.O.T.C. commission in the combat reserve, even in the freshman class, has been recommended for transfer, or has been transferred to the Medical Administrative Reserve Corps. We have not made a move without previously conferring with State Headquarters, and in return State Headquarters and local boards have in all cases shown understanding and cooperation.

In closing may I emphasize two points: first, the feeling that Dr. Lahey expressed last night and General Patterson expressed here today, that medical students will do their part when they fully understand the situation and feel the need; and, secondly, that it will be highly effective if a communication or a personal visit on the part of somebody representing the Government can be made to the school in a formal way, over and above the advice that the deans and various executive officers give, to make the students feel keenly and understand clearly just what we feel when we listen to men like Dr. Lahey and General Patterson and Colonel Lull.

Dr. John W. Spies, Galveston, Tex.—The total national defense has to include the public welfare and not simply be limited to the armed forces; consequently, those who are not qualified physically for service with the armed forces can perhaps serve their country just as well in another way.

We have an actual shortage of physicians. We have not enough physicians in this country to carry out adequately the functions demanded by the armed forces and by the public welfare programs. However, as you know, there are those who claim that it is a maldistribution and that in reality we have plenty of physicians. It takes a long time to train a physician. The quarter system will turn out a physician in a shorter time without lowering the standards, and give a fuller use of all facilities. At the same time there are some problems connected with the installation of a quarter system.

We know that the Army does not depend medically upon physicians alone, speaking broadly. There are nurses, dentists, veterinarians, dietitians and others needed. As far as the nurses go, there has been a definite step taken toward bringing back those who have retired from work and giving them refresher courses. It is being financed by the Federal Government. Another way they have tried to supplement the number of nurses is to have lay women trained up to a certain point so that they can take on a certain amount of work and relieve the professional nurse. Then there is an attempt to increase the number of student nurses through Federal aid.

Dr. Burns (closing).—We have a very definite shortage of doctors in the South, and the studies that have been made bear that out. There is no question, of course, about the poor distribution; we have that, too. But even if they were properly distributed we still should not have enough doctors in Louisiana to take care of the population on the basis of one to a thousand.

Some agency is going to attack the problem of supplying physicians to the rural communities at some time, and it is a problem that medical schools ought to consider, and consider very seriously. It is a field that is ripe for regimentation and the present military situation certainly adds responsibilities in that direction. Whatever we can do about it we ought to do.

THE TREATMENT OF GONOCOCCAL VAGINITIS IN CHILDREN WITH DIETHYLSTILBESTROL*

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and

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Among the many attempts at hormonal therapy, two have proven to be decidedly successful. The hot flushes of the menopause can be controlled in most instances by proper estrogenic therapy and gonococcal vaginitis in children can be cured with the natural estrogenic hormone administered by vaginal suppository. To Robert Lewis belongs the credit for the idea that the administration of this hormone, which changes the immature vaginal mucosa to the adult type, might result in a cure of the infection. He first gave the hormone, hypodermically, and effected some cures. Brawner and TeLinde,[2] in 1934, first administered the natural hormone in the form of vaginal suppositories and have reported a large series of cured cases. The method is quite simple and can be carried out by any intelligent mother. The only objection to the treatment with the natural hormone is the cost.

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*From the Department of Gynecology, Johns Hopkins University.

Since most of these cases are treated in free clinics, the item of expense is a serious one to the institution carrying out the treatment. Since the synthetic estrogenic hormone, diethylstilbestrol, has been available, we have considered using it in place of the natural hormone, as it is produced and sold for much less than the hormone derived from natural sources. We have treated a series of fifty children with diethylstilbestrol and will report our results in this communication. Collins and Russ[3] reported the successful treatment of twenty-five children with gonococcal vaginitis by the administration of diethylstilbestrol in milk. In general, our results agree with those of Collins and Russ, and there is little room for doubt that vaginitis can be cured by the oral administration of this synthetic hormone. These authors report that they believe the administration of diethylstilbestrol by mouth to be advantageous, since it excludes the manual manipulation necessary to the introduction of the vaginal suppository. It is true that nothing could be simpler than giving the drug in the child's milk, and yet we believe there are some disadvantages in giving the hormone by mouth, as will become evident in our report. On the other hand, we have seen little disadvantage in the insertion of the suppositories. A certain amount of manipulation is necessary in taking the smears which must be done regardless of the method of therapy. The insertion of the suppository by the mother or nurse, we believe, is less upsetting to the child than the taking of the smears by the doctor.

METHOD OF STUDY

The cases on which this study is based were taken from the Gynecological Dispensary of the Johns Hopkins Hospital. Fifty consecutive cases were treated with diethylstilbestrol, administered orally or by vaginal suppository. The group was composed of ten white and forty colored children whose ages ranged from 16 months to 11 years. The treatment was carried out for the most part by a member of the family after instruction in the dispensary. Three of the patients, however, were treated by the visiting nurse, after being unsuccessfully treated by the family. They responded promptly in each instance to the nurse's care, suggesting that the treatment had not been properly carried out by the family. The routine of treatment is the same as that which has been carried out in the clinic since 1934, when the original work on the suppository treatment with the natural estrogen was done. The patients are seen weekly during the treatment. Smears are taken and stained by the Gram method, which we feel is the only satisfactory means of studying vaginal and cervical smears. At best, the interpretation of the smears may be difficult and all of the aid afforded by the Gram differentiation is frequently necessary. Cultures, using chocolate agar as a medium, are made before, during and after treatment. Vaginal washings are made at weekly intervals while under treatment by rinsing the vagina with saline by means of a rubber-tipped medicine dropper. The washings are then examined microscopically without staining and the relative number of pus and epithelial cells noted. At the beginning of treatment, the washings are composed of almost pure pus. As the effect of the hormone on the vagina becomes evident, the pus is gradually replaced by epithelial cells, until finally the washings are composed of pure epithelium. Vaginal biopsies were taken on several cases to note the effect on the mucosa, but this is not a routine procedure. The internal pelvic organs are examined per rectum at intervals during the treatment and during the follow-up period. After the beginning of therapy, patients are seen weekly until three consecutive negative smears are recorded. Treatment is continued for two weeks after the first permanently negative smear and culture. The patients are then checked two and six weeks following the termination of therapy. Finally, a follow-up study of these cases is made and the condition of the patient noted four to twelve months after stopping treatment.

RESULTS WITH DIETHYLSTILBESTROL SUPPOSITORIES

Of the fifty children, twenty-nine were treated with suppositories as the original type of therapy. To these were added five in whom oral therapy was unsatisfactory. The suppositories contained 0.1 mg. of diethylstilbestrol. One suppository was inserted into the vagina every night during the course of treatment. Thirty-three of the thirty-four cases responded favorably. In twenty-two cases the vaginal smears became negative after one week of therapy. In eight more the smears were negative within two weeks after treatment was begun. In the remaining three favorable cases, two were negative in twenty-one days and one in twenty-five days. There were five recurrences or reinfections. These were noted at 42, 56, 66, 77 and

300 days after the end of treatment. All of these responded rapidly to a second course. Thirteen of the original twenty-nine cases showed breast enlargement. In all of these the enlargement regressed within four to six weeks after the end of therapy. No other side effects were noted in these children treated with suppositories. The vaginal response characterized by epithelial proliferation and desquamation, as noted with the natural estrogenic therapy, was seen in all cases except one. This case failed to respond after five weeks of therapy and we are inclined to feel that the failure was due to poor cooperation of the family. Since the patient lived outside the city, the visiting nurse could not take over the treatment. Oral therapy was finally resorted to with prompt results. Of these thirty-four children, then, thirty-three responded to the suppository form of treatment.

RESULTS WITH ORALLY ADMINISTERED DIETHYLSTILBESTROL

Since diethylstilbestrol has been found to be effective orally in combating menopausal symptoms, we decided to try oral administration in treating gonococcal vaginitis in children. Twenty-one cases were accordingly treated with varying doses. Since we had had no experience in dosage, we were forced to experiment by trial and error. The children were divided into three groups. In the first, 1 mg. was given three times a day; in the second group, 1 mg. was given daily; and in the third group, 0.1 mg. was given once a day. Our experiences with the three groups are given below:

Group 1.—Four patients received 1 mg. three times a day. In two, vomiting occurred through the first week of treatment, necessitating a reduction of the dosage to 1 mg. per day. In one case the vaginal smears became negative within one week and the patient showed breast enlargement, but no other systemic effects. The breasts returned to normal size in six weeks. In the other case successfully treated, the smear was negative within one week, but the culture remained positive. Five weeks after the beginning of the treatment there was a profuse purulent discharge with both positive smear and culture. Therapy was continued and the gonococci disappeared after one more week. The patient showed marked breast and uterine enlargement and developed a moderate growth of pubic hair. Nine days after stopping treatment this four-year-old child bled vaginally for one day. There has been no recurrence of the bleeding to date (nine months). The breast and uterus have returned to normal size, but a small amount of pubic hair remains.

Group 2.—Fourteen patients received 1 mg. daily as the initial dosage. To this group were added the two children mentioned above who were started on 3 mg. daily. One case which was originally treated with suppositories was also added. Thus, a total of seventeen children were treated with 1 mg. daily. In two, vomiting occurred. In one of these, the vomiting was transient and therapy was continued unaltered. In the other case it was necessary to discontinue oral therapy and suppositories were used with good results. One patient showed no vaginal response after six weeks of this dosage orally. There was, however, evidence of absorption of the drug as shown by breast and uterine enlargement and the growth of pubic hair. This patient was later treated successfully with suppositories. Fifteen of the seventeen patients, then, were cured with the dosage of 1 mg. daily. The smears became negative within seven days in five cases, within fourteen days in seven more cases and within twenty-one, thirty-five and forty-two days in the remaining three cases.

In fifteen of the seventeen patients who received 1 mg. orally, there was definite breast enlargement. In one-half of these there was pigmentation of the areolae. In three, the breast tissue became lumpy and painful during the first two weeks of therapy.

In nine of the sixteen children a palpable uterine enlargement was noted, and in three others there was questionable enlargement.

In five cases there was a growth of pubic hair, and in two children axillary hair made its appearance. Two also showed enlargement of the clitoris.

With the exception of two cases, the systemic effects regressed within six to ten weeks following the end of the course of therapy. In these two cases, the effects were still present three and four and a half months after treatment was discontinued, although some regression had taken place.

Vaginal bleeding of from one to two days' duration occurred in four patients. This symptom appeared uniformly eight to nine days following the end of the course of therapy. There has been no subsequent bleeding in any of these

patients who have been followed from four to ten months.

Finally, there were three recurrences in this group treated with 1 mg. daily. Two of these were noted while the children were still being treated. The other occurred fourteen days after the end of treatment. In all three of these cases, the smears became permanently negative after an additional week of therapy.

Group 3.—Three patients received 0.1 mg. daily. One presented symptoms of nausea, vomiting and diarrhea after three days of treatment. These symptoms disappeared immediately after therapy was discontinued. In another, the smears became negative in fourteen days and then there were two positive smears with recurrence of symptoms in the next six weeks. The third showed no vaginal response after five weeks of treatment, although there was slight breast enlargement, indicating some absorption of the drug. The first two cases were changed to suppository therapy with prompt success. In the third case, the dosage was increased to 1 mg. orally without results. Finally, suppositories were resorted to with permanently negative smears in one week.

DISCUSSION

It will be noted from the above that, although fifty patients were treated, in eight of these more than one type of therapy was given. Thus, there were fifty-eight therapeutic trials. Seven of the eight changes in therapy were from the group treated with diethylstilbestrol orally. Two were from the small group of four who received 1 mg. three times daily. The change was made because of nausea and vomiting caused by this amount of the drug. It seems apparent that 3 mg. of diethylstilbestrol per day is more than many children can tolerate. Three of the cases that were changed to suppositories were from the small group treated with 0.1 mg. per day. Even with this small dosage, nausea, vomiting and diarrhea necessitated the change in one instance, but the other two were changed because of failure of cure after trial of five to six weeks. Only two of the group receiving 1 mg. daily had to be changed to suppositories. These results seem to indicate that 1 mg. daily is the optimum oral dose, and conversely, that in many instances 3 mg. resulted in the appearance of toxic symptoms, while 0.1 mg. per day seemed to be inadequate. In the largest group treated with vaginal suppositories, a change of method of administration was necessary in only one case, and that was probably due to irregular treatment on the part of the mother.

In comparing the rapidity of action of the drug administered by mouth and by vaginal suppository, our results show that in the group treated with 1 mg. per day orally about 90 per cent showed negative smears in fourteen days. In the group treated with suppositories, likewise, approximately 90 per cent showed negative smears in fourteen days. However, at the end of seven days' treatment only one-third of the oral cases had negative smears, whereas at the end of the same time two-thirds of the suppository cases were negative. These figures indicate that, whereas the percentage of negative smears at the end of two weeks was approximately the same for the two types of therapy, the results were usually obtained more rapidly in the suppository group.

There was a striking difference noted in the systemic effects produced by the different methods of administration of diethylstilbestrol. It is noteworthy that vomiting was not present in any of the patients treated by suppositories. In only two instances did nausea and vomiting occur when 1 mg. per day was given by mouth. When 3 mg. were given per day, nausea and vomiting became troublesome in half of the small group. In the suppository group, breast enlargement was noted in 46.5 per cent of the children and this was the only side effect noted. This enlargement regressed in each instance within four to six weeks. In the group treated with 1 mg. orally, breast enlargement was present in 94 per cent and in two cases this was present three and four and a half months after discontinuing therapy. Again, in the group of seventeen given 1 mg. orally, uterine enlargement was noted in nine cases, pubic hair appeared in five, and axillary hair and clitoris enlargement in two. Finally, in four patients, there was vaginal bleeding, which began eight to nine days following the end of the course of therapy. The bleeding occurred in patients aged 4, 5, 8 and 11 years. The absence of all side effects in the suppository cases, with the exception of the breast enlargement, is striking in contrast to their frequent occurrence when the drug is given orally. It is probable that these side effects are harmless. Certainly they are transient for the most part, but without having any definite knowledge of their ultimate effect, it would seem advisable to avoid them. Freedom from them in the

suppository group constitutes an added reason for giving preference to the vaginal suppository method of treatment. We have noted no evidence of "vaginal fixation" in any child treated with suppositories.

We have attempted a follow-up study of these cases to determine the permanency of the cures and were successful in locating forty-two of the fifty cases. Forty-one of the forty-two children were well clinically and had negative vaginal smears and cultures. The other child showed no clinical evidence of the disease, but the smear and culture were positive. These follow-up studies were made nine to eighteen months after the original course of therapy.

CONCLUSIONS

(1) Gonococcal vaginitis can be successfully treated with the synthetic estrogenic hormone, diethylstilbestrol.

(2) The disease may be cured by the oral administration as well as by suppositories, but our results were more uniformly successful and were obtained on an average more rapidly with the latter.

(3) The optimum dosage by mouth was found to be 1 mg. per day, whereas 0.1 mg. used as a daily suppository was adequate to cure all cases except one in which it was used.

(4) Nausea and vomiting occurred in an appreciable percentage of the cases in which the drug was given by mouth. In no case did this occur when it was given by suppository.

(5) Systemic effects such as breast enlargement, uterine enlargement, growth of pubic hair, enlargement of the clitoris and vaginal bleeding were noted in various percentages in the cases receiving the drug by mouth. For the most part, these effects were transient and we have no direct evidence that any of them are harmful.

(6) The only systemic effect noted in the group treated with suppositories was breast enlargement, which occurred in thirteen out of twenty-nine cases. The enlargement regressed in all cases in from four to six weeks.

(7) In the light of the above data we believe that the suppository method is the method of choice in administering diethylstilbestrol in the treatment of gonococcal vaginitis in children, and that a suppository containing 0.1 mg. is adequate dosage.

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CONTINUOUS OR FRACTIONAL SPINAL*

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The history of medicine and surgery is the history of anesthesia. Since the earliest days of recorded facts, in pictures or written record, we find the early physician administering drugs to obtain some degree of anesthesia, so that he could perform operations without pain or with some lessening of the degree of pain. Two thousand years B.C., powdered henbane was used for the relief of pain of dental caries. Eucalyptus, God of Medicine, administered drugs by mouth before performing operations. Ancient Jews practiced compression of veins before circumcision as a crude type of regional anesthesia.

Surgery shows, through its progress, that the surgeon was limited by two factors: lack of aseptic technic and inability to relieve the pain of operation. As the first factor was eliminated by the work of Lister, the second factor was eliminated by the use of ether in 1846.

The modern history of anesthesia begins in 1846 with the use of ether. This drug tremendously enlarged the field of surgery and allowed the surgeon to attempt operations which heretofore he had only dreamed of doing. The surgeon then demanded better anesthesia so that he could give his skill the full run of the field of surgical endeavor. This demand from the surgeon was met by the anesthetist and is being met day by day in our hospitals, so that today the impossible surgery of yesterday has become possible.

It is not the purpose of this paper to go into the various types of anesthesia which the anesthetist has at his command, which run from inhalation of ether and numerous other gases, rectal instillations, intravenous, regional blocks (local), paravertebral blocks, spinal, transsacral, and so on, but to discuss an advance in spinal anesthesia, which we have found of great value in our work.

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Spinal anesthesia, or the paralysis of the sensory and motor pathways by drugs, at some level of the spinal cord, is not a new procedure. In 1885, Corning recorded the use of cocaine in interspinal but extradural anesthesia. In 1889, Biel in Kiel, Germany, used cocaine on himself and his co-workers and introduced it to surgical practice. In 1904, Forneau used stovane. Since that time, numerous drugs have been tried and mostly abandoned in favor of the less toxic procaine hydrochloride.

In the last twenty-five years, we have the golden age of spinal anesthesia, as exemplified by Babcock, of Philadelphia, and the Lahey clinic in Boston, as two of the outstanding exponents. The greatest problem that they and others found with spinal anesthesia was the time limit of the maximum dose. Numerous drugs were tried to overcome this difficulty, the best of which has been pontocaine and 10 per cent glucose, as reported some years ago by Dr. Sise.

To sum up the faults of spinal anesthesia, they are: (1) time limit on operation, failure to last long enough; (2) failure to take. This challenge to the anesthetist was met by Dr. William T. Lemmon,[1] [2] of Philadelphia, who, in 1939, reported a method of continuous spinal anesthesia, which he had used in over two hundred cases, without failure to take or to last. After observing this method in use at the Lahey clinic in 1940, we decided to add it to our procedures.

Indications for continuous spinal are: (1) any operation in which the time element is an uncertain factor, as in exploratory laparotomy, which may be a simple opening and closing affair, in which the patient gets only a minimum dose of the drug, or a long operation in which the patient gets fractional doses; (2) operations which take considerable time, such as (a) bilateral herniorrhaphy, (b) resection of colon, (c) resection of stomach, (d) abdominal perineal resection; in fact, any operation in which spinal anesthesia can be used in which the time limit may run over one hour.

The equipment necessary for continuous spinal anesthesia consists of a rubber mattress five inches thick, in two sections. In the upper, or body section, is a cut-out part directly opposite the lumbar spines, the buttocks resting on the lower part and the body on the upper. A flexible German silver needle, 18 gauge, very soft and malleable, with a small hole near the bevel to prevent nerve filament from blocking the end, a 10 c. c. luerlok syringe, special rubber tubing with luerlok connections which holds exactly 2 c. c., and a special introducer for the needle are needed.

Procedure.—With the patient lying on his side near the middle of the table, the lumbar spine over the opening in the mattress, we insert our special introducer and through this we insert our needle into the most available lumbar space, regardless of the operation. This is usually the second or third lumbar. The introducer around the needle is withdrawn and the stylet in the needle is withdrawn. Five c. c. of spinal fluid are withdrawn into the syringe and the needle is closed by a special cap. The patient is then turned on his back, with the needle in position, extending into the opening in the mattress. Five hundred mg. procaine mixed with 5 c. c. spinal fluid and 5 c. c. normal salt are added, making 10 c. c. procaine-spinal-fluid-salt-solution mixture. Attach the syringe to the tube and fill the tube, then attach the tube to the needle, being sure that spinal fluid flows out of the needle when the cap is removed. Introduce 0.5 c. c. of mixture into the spinal canal and wait three to four minutes. Place the patient in slight Trendelenburg position and test for the height of anesthesia. If the anesthesia is high enough, operation is started at once. If not, increase the angle of Trendelenburg and, if necessary, add 0.5 to 1 c. c. more of the procaine mixture.

We have been much surprised by the variations in anesthesia with different patients. This has varied from 50 mg., allowing an exploration of the stomach, to 200 mg. before a gallbladder incision could be made. This may account for some of the so-called failures to take.

Advantages.—(1) A small initial dose may be used with very little shock to the patient. Additional doses do not produce shock in any marked degree.

(2) Each case may be treated to the best advantage of the surgeon and the patient.

(3) There is no time limit upon the operation.

(4) Postoperative recovery is very smooth.

Difficulties.—The first difficulty we encountered in this type of anesthesia was the introduction of the flexible needle in certain cases. This led us to consult with an instrument maker in the War Department, Mr. Haas, who made up an introducer with no top, through which we insert the flexible needle without difficulty. Our second problem has been the decided variation

in the susceptibility of the individual patient to procaine, so that in the refractory individual we give the small dose of the drug, 25-50 mg. 0.5 c. c., and observe the effect for two to four minutes and then add 50-100 mg. at intervals of three to five minutes, until the desired anesthesia has been produced. We have found that some individuals will take 150-200 mg. of procaine before any effect is noted. We also found that these patients require more frequent additions of the drug to maintain the desired anesthesia, also that the refractory individual exhibits no more shock than the susceptible patient who requires only the minimum dose.

CONCLUSION

We feel that, in continuous spinal, we have found an answer to the two main problems of spinal anesthesia: failure to take and failure to last, and we also have a more rational way of administering a spinal anesthetic, in that we can vary the dosage of the drug to the requirement of the specific case at hand.

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DISCUSSION (*Abstract*)

Dr. Charles G. Obermeyer, St. Louis, Mo.—With this method there is an opportunity to regulate the dosage; patients who have before been refractory to small doses of drug can be given more after spinal has been started.

Of course, the quantity of additional drug must be judiciously decided upon and excess must not be given. We have all had the experience, I think, of giving a large dose of drug, expecting a long operation: for instance, giving 150 to 200 milligrams of drug, and then having the surgeon do merely an exploratory, closing within fifteen or twenty minutes. With this method, an exploratory may be started with 25 to 50 milligrams, and whatever is needed may be added later.

By this new method, there are few, if any, failures to take. Secondly, there is better control over the dosage of drug given, and also there is some control over the duration of the anesthetic.

The acceptability of the method has been proven. It is in use in leading clinics like the Mayo Clinic and the Lahey Clinic and Philadelphia clinics. It is not a passing fad.

I wonder about the needle, the very flexible needle about which the doctor spoke. I wonder after it is inserted into the canal, and the patient is rolled over, how that needle stays in place. We know how tightly the lumbar vertebrae are approximated, and it may be that they hold it. In giving single-dose anesthesia we must be very careful to be in the canal and to stay there after we are in.

If you are rolling the patient over it seems to me that you are taking a chance that the needle stays there. I would like to have Dr. Davidson discuss that a little further.

Again, how long should one wait for this first fractional dose to take? If one is waiting and it does not take, how far should one go in giving further dosage? Should one exceed 150 or 200 milligrams in case the anesthesia does not take?

I should like to know what Dr. Davidson's experiences have been in comparison with Dr. Schaerrer's, given yesterday: in the drop of blood pressure, for instance, after the initial dose and after the follow-up doses.

Also, whether nausea and vomiting are decreased with the smaller doses of drug.

Perhaps Dr. Davidson would also discuss the question brought up yesterday as to the reason for the sudden increase in spinal deaths in Philadelphia since Dr. Lemmon has introduced this new method.

Yesterday the question of the introduction of excess fluid into the spinal canal was brought up; for instance, taking out, say, 3 c. c. of spinal fluid and mixing it with saline and introducing, say, 6 c. c. instead of 3. What happens to the excess inserted? Is it dangerous or does it cause any ill results?

Yesterday Dr. Schaerrer pointed out something that I thought was quite interesting, and I wonder whether Dr. Davidson could feel that he was withdrawing some of the anesthetic given. That is, the second the fractional dose had been given, and the patient did not seem to stand it very well, is it possible to withdraw some of the fluid and reduce these symptoms?

Dr. George S. Mechling, Oklahoma City, Okla.—I should like to know some of the bad features about this particular type of anesthesia. We hear all of the good features; I should like to hear the other side, a little bit.

Also, I should like to know how you maintain this flexible needle in place while the anesthetic is being given.

Another question that comes to my mind is in regard to the air that might be in the tube which you connect to the spinal needle, and the possibility that this might produce postoperative headaches such as we get with the air injections that we frequently see following encephalograms and ventriculograms.

Dr. O. O. Smith, St. Louis, Mo.—I have been in the field of anesthesia for thirty years in St. Louis.

I am old-fashioned enough to believe that anesthesia is the most dangerous specialty in medicine and surgery today, so far as immediate life and death are concerned.

I have never believed in nurse anesthetists. They are unsound, in my opinion, socially, economically and legally. I hope and believe the day will come when all Class A medical schools will give a course in practical anesthesia to medical students under the supervision of competent doctors of medicine who are really interested in anesthesia. Then the time will be at hand when no one will be allowed to give an anesthetic unless he is legally qualified to sign a death certificate.

Dr. Joseph B. Bogan, Washington, D. C.—I started out with ether and chloroform, passed on to nitrous oxide, ten or fifteen years later to ethylene, about a like number of years later to cyclopropane; and so you see my development in anesthesia has been more or less

gradual. When something seemingly radical comes into view, I am not very quick in taking hold of it.

The modern intern does many spinal taps, and so in a way such procedures are not the drastic and radical things to him that they were to some of us older men.

I am very much impressed with continuous spinal analgesia, and I feel I will certainly have to adopt it, even though I am somewhat slow in adopting the new.

As Southern anesthetists we shall have to realize that Dr. Davidson is a Southerner and did not mean to inject any argumentative material into the meeting when he suggested that anesthesia began in 1846. We will have to accept his unspoken apologies.

Dr. William C. Schaerrer, Kansas City, Mo.—Serious difficulties are liable to occur with continuous spinal technic in the future. The technic requires a skilled anesthetist and should not be started by a physician and then turned over to a nurse or some one not trained thoroughly in spinal anesthetic technics. If the continuous spinal technic does not become popular, it will be because some fool has rushed in where an angel feared to tread. Much should be known before one assumes the responsibility of handling a case under continuous spinal anesthesia. One should have had a wide experience in observing the characteristics of anesthetic agents in the spinal fluid. It is the surgeon's responsibility to employ an anesthetist who is capable of evaluating all factors during anesthesia, if justice is to be done to the patient.

Any of you who use a continuous spinal anesthetic should remember that you are dealing with something that can cause death quickly. I believe all of you will be using this technic, because it is nearly foolproof, if you master the technic.

Dr. R. A. Harris, Quincy, Ill.—What would be the objection to using an introducer, say a fairly short one, and leaving the introducer in? It seems to me that would mean that the needle would be a little bit more easily inserted. I wonder if it would stay in place as well.

What would be the objection to attaching the syringe before the patient is turned? It seemed from the picture that it was a little clumsy to get at after turning.

Dr. L. A. P. Stein, St. Louis, Mo.—I have been schooled in anesthesia in Barnes Hospital, and as a routine we use chloroform for obstetrics and ether gas or dropped ether for repair. This has been ideal. Most obstetricians seem to think that chloroform, if given properly by a good anesthetist, gives the best relaxation, and if it is not given in overdoses, is less toxic for both mother and baby. They do not use it for extensive repair; they use nitrous oxide and oxygen or dropped ether if the obstetrician prefers it.

I should like to ask Dr. Davidson about the flexible needle. I have had the misfortune of seeing a needle break off in the vertebral column and we had to do a laminectomy. It would be a catastrophe if the needle broke off in using Dr. Davidson's method.

At almost every meeting we anesthetists attend we seem to take a slam at the nurses. I feel that in small hospitals, and in many other places, we cannot get a physician anesthetist, and that is our own fault, because we do not school M.D. anesthetists. We do not give them diplomas in anesthesia.

Nearly everyone, if he is at all ambitious, when he goes out from his internship wants to become a surgeon. Almost any young anesthetist, during an operation, watches not the anesthesia but the surgery, and that is a most unfortunate thing.

I was schooled by a nurse anesthetist, and I am very proud of every moment I have spent with the nurse anesthetist. I have learned how to give very good anesthesia under a nurse who gave me a good schooling in general anesthesia, and who knew what she was talking about.

The nurse anesthetist has her place, and if she is admitted to give an anesthesia in a recognized hospital, a surgeon assumes part of the responsibility, and if he wants any other anesthetic which the nurse may not give, then he must do it himself or not request that anesthesia. After all, the anesthetic is a matter of choice, and any anesthetic, regardless of kind, if it is properly given by some one who has had some experience, is good.

Dr. Davidson (closing).—Sellman's work in the Lahey Clinic upon nausea and vomiting in spinal anesthesia showed that in a series of 400 cases, nausea and vomiting were lowered from 32 per cent to 16 per cent by using pantopon instead of morphine for preoperative sedation.

Some of the nausea and vomiting in spinal anesthesia comes from preliminary medication. Dr. Schaerrer stressed that yesterday. We use morphine as a preliminary narcotic and also pentobarbital.

With continuous spinal anesthesia we start an intravenous drip of normal salt and 5 per cent glucose immediately after the patient has the first dose of procaine hydrochloride. If the patient is at all restless, we give sodium ethyl thiobarbiturate in small doses through the tube and run it in a little faster until that hits them, which usually takes about thirty seconds to a minute.

We have not been troubled with nausea and vomiting in these patients.

We turn these patients over on their backs very carefully. I am very critical of orderlies who help me, and we have good ones. We immediately put a pillow or a rest underneath their shoulders and heads so that they are broken a little bit at the upper end of the spinal column. With our Trendelenburg, even if our anesthetic goes up, we think it cups there and will not go any higher.

The Chairman asked about some of the bad features of continuous spinal. The worst feature of continuous spinal is a poor anesthetist, and the second bad feature is a poor surgeon. The surgeon who calls you in to give a spinal anesthetic or a continuous spinal anesthetic who is not used to operating under a spinal anesthesia is giving you a bad result before you start.

The thing to do is to be just a little bit better than he is. An anesthetist has to know what he is doing. The thing we need more than anything else in the anesthetic profession is trained anesthetists.

There is no air in the tube. We fill the tube and shut it off with the little lock valve, and when we put it on it is full of spinal anesthetic mixture.

The volume of spinal fluid in the canal has been tested out, and the average is about 45 c. c. of spinal fluid. We take out 5 c. c. Some men do not do that, but we take out 5 c. c. because we want to reduce it. We lose a little when we take the stilette out, a little when we put the cap on, a little more when we take the

cap off, and while I have not measured these losses, I feel that they have taken at least 5 c. c. or perhaps more of fluid.

There is a very real problem, that is, where this anesthetic goes. If we were to take out a quarter or a third of the spinal fluid and put this anesthetic back in, how high would it go? That is one of the unanswered questions.

In regard to the excess fluid after we replace what we have taken out, if we have to put more in, we add it in small amounts, 0.5 or 1 c. c. over a long period of time. We do not throw much fluid into the canal with the average operation. This procedure is for an operation that takes time; I mean, high-grade extensive surgery. We have to add at very infrequent intervals only a small amount of fluid.

Giving the small initial dose, we have found that our drop in blood pressure is at a minimum. We disregard it except that routinely we give all patients who receive procaine spinal anesthesia, as soon as the patient reaches the operating floor (not the operating room, but the operating floor) 3/8 grain of ephedrine. We have no trouble with fall in blood pressure. The subsequent doses that we give of procaine certainly produce very, very little drop.

There is only one reason for failure to take that I can see, and that is some abnormality in the spinal canal. I had a failure to take in a girl who had meningitis. I think she was blocked. A tumor of the spinal cord, or something that will obstruct the flow of the anesthetic to the nerve roots, is the only reason I can see for a failure to take. The needle is in the canal: you can prove that by aspirating back into your syringe.

I think I answered the question about the increase in spinal deaths. There are too many people giving spinal anesthesia who have a spinal needle and nothing else. A man who might be able to do a varicocele might start upon an abdominal peroneal. He is not qualified, gentlemen. One must have the qualifications.

I think the safest anesthetic in the world is straight old drop ether, but I do use these methods where they are indicated.

Why does the needle stay in place? The patient is flexed. There is a space between the vertebral bodies. When you turn him on his back, that space comes back, and I am sorry the photographer who took the films ran out of film as we pulled this needle out or you would have seen it. The needle bends in the soft tissue and when you pull it out it grates between the vertebral bones. You can feel them. They actually grasp the needle. It is the friction of the vertebral bodies that holds the needle in place.

How long should one wait for the dose to take? There is a criterion about procaine spinal anesthesia that, regardless of which side you have the patient on, after you give your initial dose, if the patient is going to get a take, he will tell you he has a little tingling in his toes. Then you know he has a take. It starts there.

We wait seven or eight minutes sometimes to find out whether we are going to get a take or not. In continuous spinal anesthesia we have not failed to have a take yet.

How much procaine hydrochloride should we give? Give it according to the patient's needs. I mean, if you have a patient going into shock, you certainly are not going to give any more procaine. If you have good anesthesia, you are not going to give it. If the patient is all right and shows no signs of shock or overdosage, go ahead. Give it slowly; let him have it.

These needles are very specially made of German silver, and we have had no difficulty with breaking. We have tested them by bending them outside the body, in our hands, over a long period of time, and we have had no trouble with breaking of needles. We did have trouble once with the breaking of an ordinary spinal puncture needle.

I do not know much about nurse anesthetists. With the extension of high grade surgery in St. Louis, Washington, New York, Boston and Cleveland, the surgeons are demanding better anesthetics, and it is up to us to provide them.

ACUTE CHOLECYSTITIS*

By WOOLFOLK BARROW, M.D.

and

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Of 1,000 patients with gallbladder disease seen in the Lexington Clinic, 159, or 15.9 per cent, had acute cholecystitis (*Fig. 1*). A statistical analysis of this latter group has been made in the hope that it would be helpful in planning the treatment of such patients in the future. Details of preoperative preparation and of postoperative care, although of the greatest importance, are not considered here because they lie beyond the scope of this paper. The diagnosis of acute cholecystitis was limited to those patients in whom the clinical history, physical findings and laboratory data were all consistent with this diagnosis. All of these patients were having an "acute attack" characterized by most of the signs and symptoms of pain, fever, leukocytosis, local tenderness and palpable mass, and in whom the gallbladder is engorged and edematous or where an abscess or suppurative process is present in the gallbladder, the bile ducts or liver.

Of the 159 patients with acute cholecystitis 119, or 74.5 per cent, were females, and 40, or 25.5 per cent, were males (*Fig. 2*). The majority of these patients were in the older age groups just as gallstones are encountered more frequently in elderly individuals (*Fig. 3*). A significant proportion, however, 32.2 per cent,

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*From the Surgical Section of the Lexington Clinic.

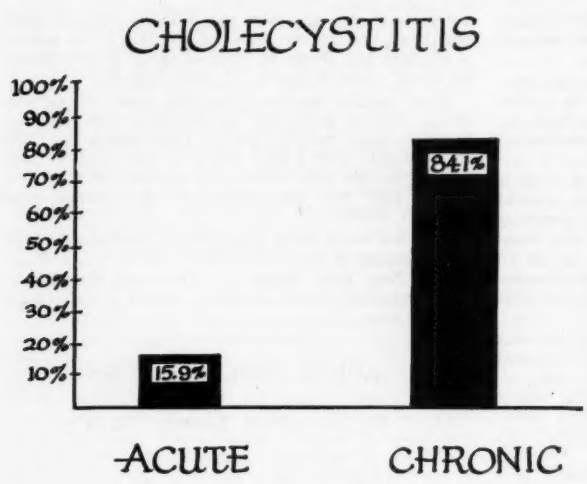

Fig. 1

were less than 40 years of age. The oldest patient was 80 and the youngest 23.

From an etiologic point of view, we have encountered three distinct types of acute cholecystitis. The first of these is due primarily to vascular insufficiency. It is not frequent. There were two such instances in this series of 159 patients. In one patient there was a volvulus of a long, loosely attached gallbladder. The onset of acute cholecystitis in the second patient occurred twelve days after an intestinal resection for mesenteric thrombosis and may have been due to extension of the disease to the cystic artery.

A second type of acute cholecystitis is due to primary bacterial invasion of the gallbladder. It again has not been common in our experience. The three patients who developed acute cholecystitis during or soon after having typhoid fever and in whom a pure culture of B. typhosus was recovered may be cited as examples of this type of acute cholecystitis.

In the great majority of patients with acute cholecystitis the onset is associated with obstruction of the cystic duct. This obstruction is most frequently due to impaction of a gallstone, not uncommonly a single stone. Gallstones were found in 92 per cent of the patients in this series (*Fig. 4*). The onset of acute cholecystitis in one patient was coincident with the administration of dye for a cholecystogram. Exacerbation of biliary colic has been observed on several occasions under similar circumstances. Bacterial infection in acute cholecystitis is almost always secondary to obstruction of the gallbladder and the consequent changes in its circulation. It may even be absent. When present it is usually less severe than in appendicitis because the organisms are fewer in number and less virulent in type.

On pathologic examination the most constant finding was evidence of pre-existing chronic cholecystitis. There was fibrosis, flattening of the mucosa and eosinophilic infiltration in almost every specimen. Six out of seven of these patients with acute cholecystitis gave definite histories of preceding difficulties referable to their gallbladders, and as we have mentioned before, 92 per cent had gallstones. Had cholecystectomy been performed on these patients prior to their acute exacerbation, the mortality rate would have been considerably less.

The mortality rate for individuals more than 70 years of age with acute cholecystitis was 25 per cent. The mortality rate for the entire group was 8.3 per cent (*Fig. 5*). In individuals in their twenties with acute cholecystitis, the indicated mortality rate was unexpectedly high due, we believe, to reluctance to make the diagnosis

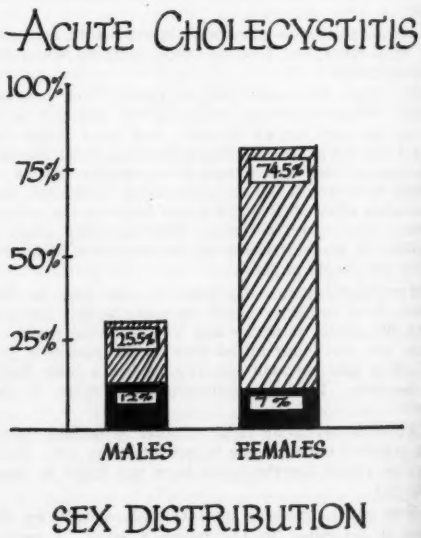

Fig. 2

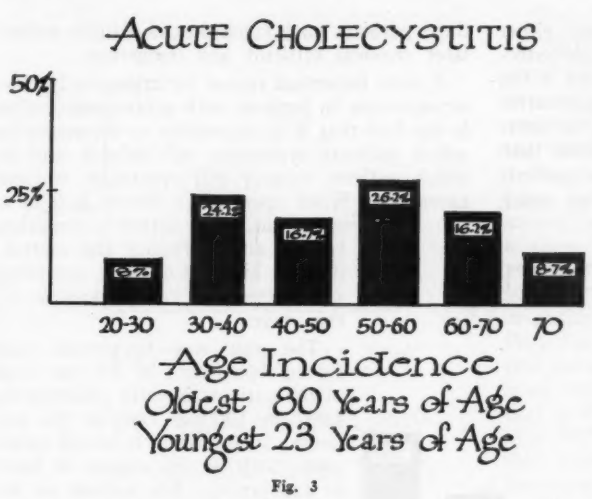

Fig. 3

of acute cholecystitis in patients of this age resulting in improper treatment or at least a delay in instituting proper treatment.

The causes of death in this group of 159 patients were: pneumonia in one patient; hepatorenal syndrome in three patients; peritonitis in three patients; postoperative hemorrhage in three patients, all operated upon prior to the advent of vitamin K; and cardiovascular accidents in three patients.

In the treatment of patients with acute cholecystitis our primary consideration has been the safety of the patient. Secondary but none the less important considerations have been the length of morbidity and the tendency to recurrence of symptoms. In patients with early acute cholecystitis our experience with cholecystectomy after adequate preoperative preparation, with fluids, electrolyte and vitamins C and K, has been similar to that of others. We have found a mortality, morbidity and incidence of postoperative complications in patients with acute cholecystitis operated upon within two or three days of onset to be similar to that experienced in patients operated upon for chronic cholecystitis.

We prefer cholecystectomy in all patients with gallbladder disease, acute or chronic, where local or systemic conditions do not forbid it. Removal of the gallbladder will minimize future difficulty and has not increased the morbidity or mortality where patients are properly selected. In this group of patients the death rate and the hospital morbidity were actually higher in patients treated by cholecystostomy than in patients treated by cholecystectomy (*Figs. 6 A* and *B*). Since cholecystostomy was done in the more acutely ill patients, the higher mortality associated with this operation probably reflects the serious nature of the patient's general condition rather than the relative dangers of the two procedures. We are convinced, however, that removal of a mass of potentially infected tissue, such as the gallbladder, is desirable. And, in our experience, cholecystectomy has almost always been possible in the first few days, for inflammatory changes are then confined to the gallbladder and dissection from surrounding tissues is not difficult. The localized edema facilitates rather than hinders removal, particularly if dissection is carried from above downward.

The wisdom of prompt cholecystectomy has been questioned for two reasons. In the first place, there is some risk inherent in any operative procedure, and in the second place more than 75 per cent of the patients with acute cholecystitis will subside under conservative treatment. If acute symptoms do subside, however, a diseased gallbladder remains, and, almost without excep-

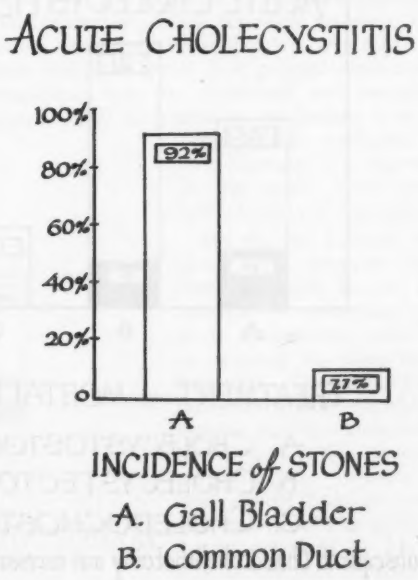

Fig. 4

tion, will continue to cause symptoms either acute or chronic in nature, so that cholecystectomy eventually becomes necessary, even if the acute symptoms do subside under a conservative regime. Since cholecystectomy early in acute cholecystitis is but little more hazardous than in chronic cholecystitis delay in these patients only increases the length of time during which these patients have symptoms and often makes later removal difficult and dangerous.

A more important reason for urging early cholecystectomy in patients with acute cholecystitis is the fact that it is impossible to determine in which patients symptoms will subside and in which patients surgery will eventually become necessary. When operation is forced it is at a time when the patient's condition is poor and morbidity and mortality are high. Complete operative procedures are rarely possible at this stage.

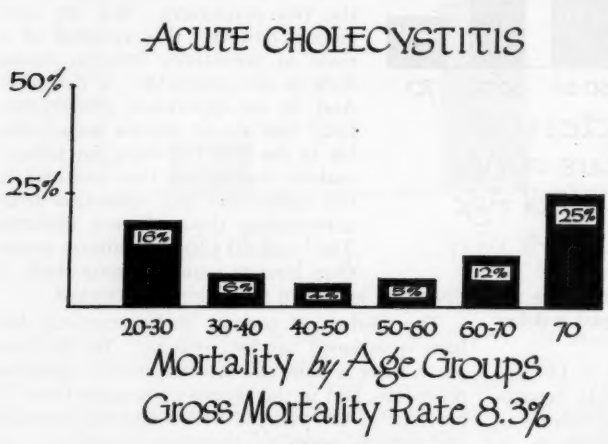

Fig. 5

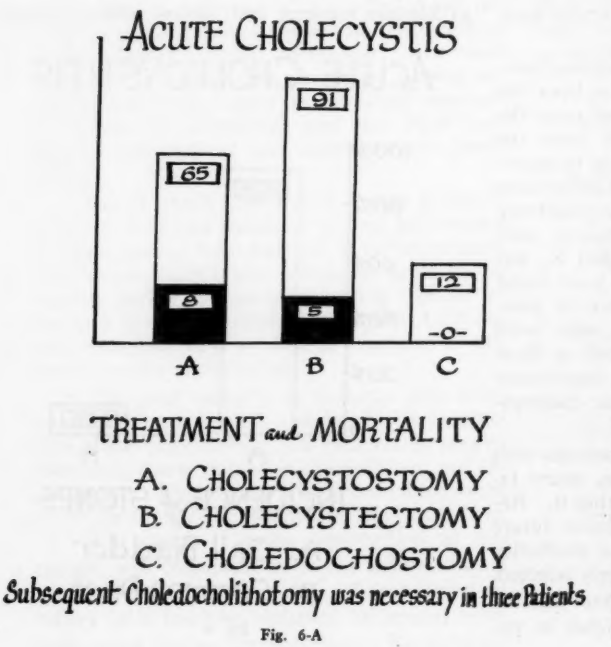

Fig. 6-A

The only way to prevent late forced operations in 25 per cent of the patients is early cholecystectomy in 100 per cent of the patients. The severity of initial symptoms, such as the degree of fever or tachycardia, has formed no index of the severity of the subsequent clinical course in these patients with acute cholecystitis. Certain patients may have a mild onset and yet become gravely ill with septic cholangitis, pancreatitis, hepatitis and peritonitis. Laboratory determinations, such as the white and differential counts, and sedimentation rate, have failed entirely to indicate those patients in whom prompt remission may be expected or those in whom serious complications are to be anticipated.

In another group of patients with acute cholecystitis who may seem to be making a rapid recovery with subsiding fever and leukocytosis, as well as decreasing tenderness and subjective discomfort, the damage to the gallbladder is progressing. We have seen localized gangrene of the gallbladder at operation due to pressure necrosis of a gallstone time and again in patients in whom the clinical evidences of acute cholecystitis were fast disappearing. Free perforation of the gallbladder with subsequent peritonitis occurred in a patient thirty hours after admission to the hospital. Her temperature was 99.2° F.; the leukocyte count 11,200 with 78 per cent polymorphonuclear neutrophils. Such an accident can be prevented only by surgical intervention in all patients

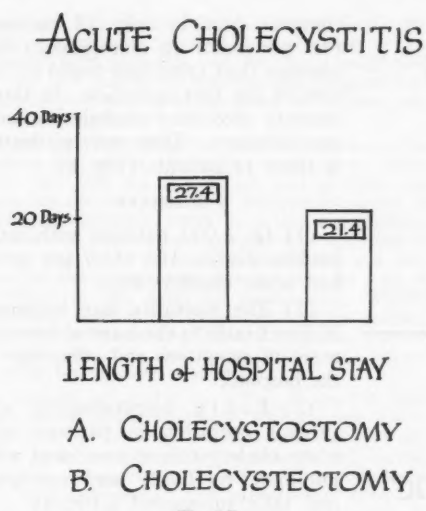

Fig. 6-B

with acute cholecystitis before there is time for such accidents to occur.

In this group of patients, irrespective of the type of treatment employed, the mortality rate was 3 per cent in those patients hospitalized within 24 hours of onset, 6 per cent in those patients who waited from one to three days to come to the hospital, and 10 per cent in those patients who delayed more than three days before coming to the hospital. In other words, the sooner the patient with acute cholecystitis is hospitalized, regardless of whether he is to be operated upon or to be treated expectantly, the better the prognosis (*Fig. 7*).

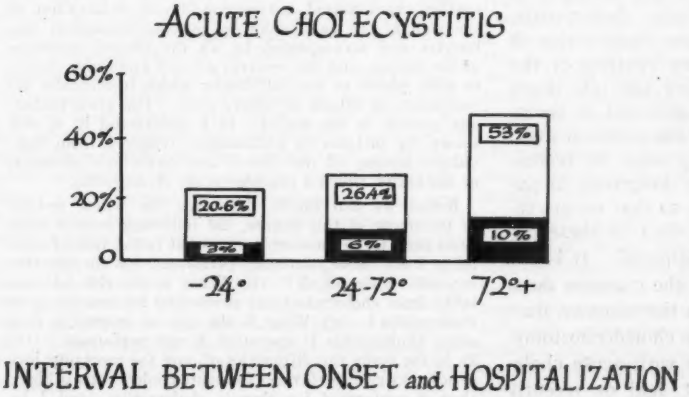

Fig. 7

That dilatory tactics are widespread is attested by the fact that only 20 per cent of these patients entered the hospital within 24 hours of the onset of their acute symptoms, and 50 per cent waited more than three days before coming to the hospital.

We feel that at the present time there is a great need for education in this respect both among the laity and the medical profession just as there was in regard to acute appendicitis forty years ago. And we are convinced that the results of early diagnosis and prompt treatment in patients with acute cholecystitis will be reflected just as beneficially in the death rate from this disease as has been in the death rate from acute appendicitis. We wish to emphasize again that in this group of patients, at least, the patient with acute cholecystitis who waited more than three days before coming to the hospital had three times the chance of dying that the patient had who came to the hospital on the first day of his acute episode.

In patients with acute cholecystitis of several days' duration immediate operation may not be the treatment of choice. In fact, it has been our policy to treat patients with acute cholecystitis first seen more than three days after onset by supportive measures so long as they continue to show a satisfactory response. These patients are frequently severely toxic and poor operative risks. They require more extensive preoperative preparation, using the same measures commonly employed in supportive treatment. If these measures result in a prompt remission of symptoms, they are continued and surgery is delayed until such time as the patient is in the best possible condition and local changes have regressed to the point where cholecystectomy will be safe.

We do not believe, however, that operative interference should be too long delayed in patients with acute cholecystitis who fail to respond to conservative measures. Continued fever, tachycardia and leukocytosis usually signify extension of sepsis, and active measures are indicated. In such patients simple drainage or partial removal of the gallbladder as described by Martin may be the part of wisdom.

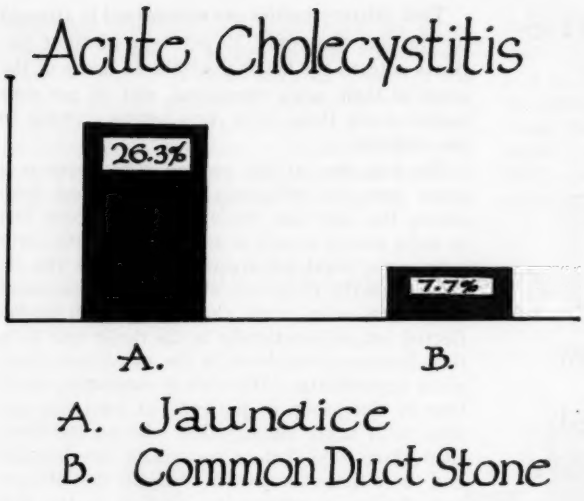

Fig. 8

It is apparent from the above that we have no Procrustean attitude in the treatment of these patients. Many of them are at the age when other serious ailments may exist. Coronary disease, angina pectoris, hypertensive heart disease, diabetes, failing kidney function, must all be reckoned with when present. It may well be that no operation is sometimes the wisest course. More important even than early operation are those measures aimed at improving liver function, the administration of glucose, bile salts (dehydrocholic acid), adequate protein, and vitamins.

In patients with acute cholecystitis the indications for choledochostomy are not identical to those in patients with chronic cholecystitis. Jaundice in patients with acute cholecystitis is frequently due to inflammatory swelling of the pancreas or tissues surrounding the bile ducts or to a septic cholangitis. It does not of necessity *per se* indicate a stone in the common duct. Furthermore, choledochostomy may be technically more difficult and more dangerous in patients with acute cholecystitis, so that we are reluctant to open the common duct in these patients unless a stone can be palpated. It is our practice to aspirate bile from the common duct. Golden yellow clear bile from the common duct is a definite contraindication to choledochostomy. In this group of 159 patients with acute cholecystitis 41, or 26.3 per cent, had or recently had had jaundice, yet stones were found in the common duct in only 12 patients (7.7 per cent). In nine patients the common duct stone was found at the time of the first operation. In three patients secondary choledochostomy was necessary. There were no deaths in these 12 patients (*Fig. 8*).

SUMMARY

(1) Of 1,000 patients with gallbladder disease 159 (15.9 per cent) had acute cholecystitis.

(2) The mortality rate increased in direct ratio to the interval between onset of symptoms and admission to the hospital.

(3) Early hospitalization and prompt operation in patients with acute cholecystitis is associated with minimum morbidity and mortality and little subsequent difficulty.

(4) Partial cholecystectomy is frequently wise in those patients with extensive inflammation around the common duct.

(5) Jaundice in patients with acute cholecystitis may be due to inflammatory changes around or in the bile ducts rather than to choledocholithiasis and is not an indication *per se* for common duct exploration.

DISCUSSION (*Abstract*)

Dr. Willard H. Parsons, Vicksburg, Miss.—It is essential that those discussing the treatment of a condition have in mind similar pathologic processes. The essayists stated that in many of their patients the gallbladder microscopically showed "only chronic changes and a very few showed only acute changes." My remarks will be limited to the management of acute cholecystitis characterized microscopically by infiltration of the wall of the gallbladder by polymorphonuclear leukocytes and accompanied by all the clinical evidences of the disease, and my remarks are not applicable simply to mild edema of the gallbladder which incidentally accompanies an attack of biliary colic. The gross pathology present in the malady, as I understand it, is well shown by pictures of gallbladders removed from individuals having all the clinical and pathologic evidences of the entity which I consider acute cholecystitis.

Before we can finally determine the wisest method of treatment of this disease, the following general questions need to be answered: (a) what is the risk of mortality from cholecystectomy performed for chronic cholecystitis with calculi? (b) What is the risk of mortality from cholecystectomy performed for genuine acute cholecystitis? (c) What is the risk of mortality from acute cholecystitis if operation is not performed? (d) If, in the main, the difficulties of, and the mortality incident to, surgery performed for acute cholecystitis is higher than if performed for chronic cholecystitis (and I believe both are increased) is it possible to identify those

patients who, having acute cholecystitis, will under conservative management proceed to perforation of the gallbladder with peritonitis and who, as a result, will die? (e) Is it possible to determine the optimum time for surgical intervention in the group of patients who do require surgical aid?

The authors have presented excellent arguments for immediate surgery for all patients having acute cholecystitis. Yet they say that 53 per cent of their own patients are not seen at a time when early surgery is possible, an experience which is in no sense unique. They advocate delay in those patients who have been ill for 72 or more hours previous to consultation and they practice in this group supportive measures so long as the patients in this group do satisfactorily. Walters believes, and I am in perfect accord with his opinion, that it requires two or three days to determine whether the patient with acute cholecystitis will or will not do best under conservative treatment.

The authors say, and I am willing to concede, that patients having acute cholecystitis who are seen within the initial 48 or 72 hours of the disease and who are operated upon immediately by surgeons of wide experience will do satisfactorily. I am even more heartily in accord with their opinion that patients seen (and the majority of individuals suffering acute cholecystitis in my own experience fall in this group) after that interval should be treated conservatively provided their progress under that regime is satisfactory. McClure and Fallis have well shown that older individuals generally do poorly under conservative management. Persistent fever of more than 102 degrees or greatly elevated leukocyte counts, while in no sense infallible guides, are definitely helpful in distinguishing those patients who had best be subjected to exploration. It is, however, only fair in this connection to cite the experience of Walters and his associates in this regard. Wesson, Montgomery and Walters, in 1937, reported that of 76 patients operated upon for acute cholecystitis, in 16 (21 per cent) there was rupture of the gallbladder, and in 18 (24 per cent) there was gangrene of that organ, so that in this particular series in 34 (45 per cent) of the patients rupture of the gallbladder had occurred or was imminent. Further, Walters and his associates in 1940 report their mortality rate following cholecystectomy for acute cholecystitis as 1.9 per cent and for cholecystectomy done for chronic cholecystitis 1.6 per cent. In the hands of these individual surgeons, the mortality rates following intervention for acute and chronic inflammatory lesions were in this particular year almost identical.

Agreeing fully with Dr. Massie and Dr. Barrow that "the primary consideration should be (in the treatment of this as of any malady) the safety of the patient," it seems to me the present ideal would be to recognize if possible those individuals who, having acute cholecystitis, will not survive or are not apt to survive the attack without active surgical help. Unfortunately, there are no extraneous aids which will take the place of sound clinical judgment in determining which patient should be operated upon or the precise moment at which such intervention should be practiced. It is imperative that those patients who are to be operated upon should, prior to surgery, have adequate and intelligent preparation. No hard and fast rule can properly be made as to which patient should be explored or the exact time for exploration.

Dr. R. L. Sanders, Memphis, Tenn.—The proper surgical treatment of gallbladder disease has long been an absorbing subject at medical meetings. Thirty years ago, one of the most debated questions was: shall we drain the gallbladder or remove it? At a meeting of the American Medical Association in Cleveland, many years ago, the morning papers said: "Charlie says take it out, George says drain it," speaking of Charles Mayo and George Crile. They argued over the matter for a long time. Now, however, I believe we are agreed that, in the majority of cases wherein the gallbladder itself is diseased, removal is the wisest procedure.

Today, the paramount problem concerns the management of acute cholecystitis. Shall we operate immediately, or shall we defer operation in anticipation of a subsidence of the inflammatory process? Most of us who have had a fairly large experience in gallbladder surgery have given the answer a great deal of study. I should like to speak of two or three features of acute cholecystitis which have a bearing upon the matter.

The first of these is the relation between acute cholecystitis and strangulation as it is seen elsewhere. The essayist has mentioned that few of us believe the acute stage is precipitated by infection; rather, it is caused, in more or less degree, by strangulation. I have seen such strangulations in numerous cases, the acutely inflamed gallbladder being not unlike a strangulated hernia or an ovarian cyst on a twisted pedicle. Frequently the obstruction is produced by an anomalous vessel crossing over the duct. The tissues are markedly edematous and have a watery appearance, as in the presence of strangulation elsewhere. Further, just as release of a strangulation of a hernia is followed by prompt recovery, so also is removal of such a gallbladder in the early hours followed by a most dramatic recovery. I do not recall our mortality in these cases, but it is exceedingly low. I am therefore inclined to think that, when the diagnosis is made reasonably early, the gallbladder can be safely removed. Incidentally, when the gallbladder is distended and the ducts and vessels cannot be identified, dissection from above downward is advisable. In our experience, recovery has been most satisfactory following this procedure.

The second feature of which I should like to speak, and which the essayist also touched upon, is that of jaundice. Formerly, it was believed that every case of jaundice was produced by a stone in the duct or some obstruction at the outlet, such as an inflammatory lesion at the head of the pancreas. Now, we know that in a high percentage of these cases there is no stone in the duct. I have seen many patients with an icteric index ranging anywhere from 15 to 40 who, at operation, were found to have an inflammatory reaction produced by strangulation. I agree with Dr. Massie that it is usually dangerous to open the common duct under such conditions unless one is reasonably certain a stone is present.

The third matter to which I wish to call attention is perforation. Many surgeons have said they have seldom seen a perforation of the gallbladder. That has not been our experience. At the Western Surgical Association meeting in Kansas City a few years ago I reported forty-eight perforations of the gallbladder, of the acute, subacute and chronic type, in a series of 960 cholecystectomies, making an incidence of almost 5 per cent. I think if we will record every case, whether that type

which perforates posteriorly into the liver substance, being produced by an umbilicated bed of stones, or those protected by the colon, the duodenum or pylorus, or the ones perforating into the peritoneal cavity, we will find the incidence to be 5 per cent. By approaching this subject with an open mind, believing that perforations do occur in from 2 to 5 per cent of cases, and that we can prevent such serious complications by removing the gallbladder early, we will do these patients a great service.

I am not radical in my views on this subject. I do not believe in operation if deferring it will give the patient a better opportunity. Yet, I know that complications do occur in cholecystitis, rendering the mortality and morbidity greater. If one can make a diagnosis within the first 48 or 72 hours, therefore, and remove the gallbladder before perforation takes place, relieve the strangulation and the edema which produces the jaundice, other things being equal, the outcome should be eminently successful.

Dr. J. Duffy Hancock, Louisville, Ky.—I find myself leaning toward the side of early operation in these cases. When we speak of perforation and peritonitis we are apt to overlook or forget the fact that perforation also occurs posteriorly and into the liver, with formation of multiple abscesses of the liver, which greatly increases the risk of the patient.

In view of that fact, together with the fact that the pathologic change which occurs in acute gallbladders is different from that in appendicitis, in that it is not necessary to have infection first, but that the necrosis can follow strangulation and edema resulting from occlusion of the duct by stone, I think that the patient's best chance in the majority of cases where they can be seen in the first 48 or 72 hours lies with an early cholecystectomy.

Dr. Barrow (closing).—The greatest problem in the treatment of patients with acute cholecystitis is the difficulty we have encountered in getting these patients to the hospital within the first 24, 48 or 72 hours of their attack. Our figures have thoroughly convinced me at least that whether these patients are operated upon or whether they are treated by delayed measures, their prognosis is much better the sooner they are admitted to the hospital; and let me emphasize again, irrespective of the method of treatment.

Certainly there are different pathologic types of acute gallbladders. In the peanut type, which has had much preceding inflammation, the problem is very different from the hydrops of the gallbladder. Surgery is without question technically more difficult in patients with long-standing preceding chronic cholecystitis. And this, in our opinion, is perhaps one other good reason for advocating cholecystectomy in patients with chronic cholecystitis in quiescent periods.

The other thing emphasized by this analysis which interested me a great deal is the fact that jaundice, even though it may follow the attack of acute cholecystitis, does not always mean a common duct stone. I personally have had two rather embarrassing opportunities to find that there was no stone in the common duct at a secondary operation after removing the gallbladder during an acute episode of cholecystitis.

PALLIATIVE TREATMENT OF IRREDUCIBLE CONGENITAL DISLOCATIONS OF THE HIP*

By CHARLES J. FRANKEL, M.D.
University, Virginia

In practically every case of irreducible congenital dislocation of the hip treated at the Shriners' Hospital for Crippled Children in St. Louis during 1940, the question arose as to what was the best corrective procedure to use.

Because of the uncertainty of our conclusions, we have studied some of the cases seen there over a period of ten years. Only those cases which had had an adequate follow-up examination at the hospital and in which at least a year had elapsed since discharge, were included. We have also reviewed the recent literature to see what other clinics had done about the problem and it was surprising to us how little had been written about palliative procedures. An excellent standard with which to gauge results was set up by Galeazzi's Clinic and used by Steindler[1] in his report in 1935 and slightly altered by Kidner.[2]

Results are classified as excellent, good, fair, poor, and bad.

"Excellent" means a perfect clinical result without limp, Trendelenberg sign, disability, loss of motion, shortening, atrophy, easy fatigue, or x-ray showing significant changes.

"Good" means an excellent clinical result without disability, but with slight limp, Trendelenberg sign, shortening or slightly limited motion and slight x-ray changes.

"Fair" is a little worse than good. There is some fatigue plus a slightly greater degree of loss of motion and change on x-ray examination.

"Poor" means practically no change in the original shortening. There is painful limited motion, fatigue and fairly marked destructive changes on x-ray.

"Bad" means complete failure with considerable pain, many secondary changes in posture, disability and of course extreme x-ray changes.

At the present time the methods in use are:

(1) Shelving

(2) Osteotomies (Schanz, Lorenz and the Haas modification)

(3) Anterior transposition

(4) No operative treatment, but the use of built-up shoes

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*Read in Section on Bone and Joint Surgery, Southern Medical Association, Thirty-Fifth Annual Meeting, St. Louis, Missouri, November 10-13, 1941.

*From the Department of Orthopedic Surgery, University of Virginia.

(5) Combination of any of these procedures

The Shelving operation is perhaps the most popular palliative procedure in use today. Dickson,[3] Kidner, Le Cocq,[4] Gill,[5] Phemister, Ober, Compere,[6] Ghormley[7] and many others recommend it.

Ghormley says that in cases with the head high, posterior and irreducible, a shelf is contraindicated, as it does not restore the center of gravity to normal.

Gill, in describing his Type IV case in which the head lies high and cannot be dragged near the original socket, suggests a partial transposition, forming a new socket above the old one and then laying down a shelf. He reported a number of cases in which most of the patients retained from 20 to 30 degrees of motion, perfect stability, and had little or no pain.

Howarth[8] stated that symptomatically, anatomically and functionally the best results were obtained when shelves were turned down. The worst results came from having a socket gouged and the position maintained under tension against the roof of the new acetabulum. Dickson felt that his results in using the shelf were satisfactory as far as function was concerned, but that the method was far short of an ideal cure.

Compere, in analyzing his and other failures in cases which had shelves, concluded that they were due to:

(1) Failure to maintain the graft low enough over the femoral head.

(2) Poor function of the muscles which abduct and stabilize the hips because of the short distance between their origins and insertions.

(3) The fulcrum was more lateral with respect to the midline of the body and the load placed on the hip abductors was excessive.

(4) The secondary acetabulum was rarely adequate.

(5) Excursion of the head of the femur on the side of the ilium produced degenerative changes and caused pain on walking.

(6) When the dislocation was unilateral, there was excessive shortening; this factor caused failure, inasmuch as the patient's subjective symptoms were not greatly relieved.

(7) The limp and Trendelenberg were rarely corrected.

In a group of cases reported by LeBreton, Stern, McCausland and others, it was found that 78 per cent of the patients who had had the shelf operation had satisfactory results.

A. R. Smith[9] concluded, after exhaustive analysis of his cases examined at the University of Iowa, that the shelf operation was far from the panacea that it is sometimes considered. Children with unilateral shelved dislocations had a good chance of reaching 15 years of age with only limp and bad gait, but after that they might expect pain and fatigue. In cases of bilateral dislocations they could expect pain and fatigue at the age of 10. His series of osteotomies did not give favorable results.

The osteotomies were strongly recommended by Gaenslen,[10] who felt that the Schanz operation was a better osteotomy in that it was a true osteotomy and not a bifurcation as is the Lorenz, the von Bayer type and the Haas modification.

The advantages claimed for osteotomy were:

(1) Safety and simplicity
(2) Improved stability
(3) Diminished lordosis
(4) Freedom from pain and fatigue

Complications noted were knock-knees, nonunion, limited motion, splintering of bone, loss of angle, excessive angulation, and stiff knee.

Steindler reported 68 to 91 per cent improvement in cases in which osteotomies were done. The indications were similar to those for a shelf, namely:

(1) Transposition was uncertain

(2) The hip was irreducible and constantly redislocated

(3) The patients were usually over ten years of age

(4) Pain, fatigue, spasm, limp and Trendelenberg sign persisted

Gill concluded that the high osteotomies of the Lorenz type depended upon the formation of a new weight-bearing line and he questioned the ability of the small bony spicule to carry weight. The low osteotomy of the Schanz type depends upon the upward thrust's being transmitted to the pelvis and soft structures above the upper end of the femur and is therefore more satisfactory. Milch[11] claimed that osteotomy required more technical skill and was not quite so simple as many orthopedists claimed. In analyzing the number of cases in which the osteotomies proved to be a failure, he found that in young patients the formation of a spike on the distal fragment was a frequent cause of pain and that in adults it had to be resected before satisfactory results could be obtained. Further, it was extremely important that an excessive angle formed by the femoral shaft with a line drawn from the femoral head to the upper end of the osteotomized shaft of the femur be guarded against.

Massart, of France, used a combined bifurcation and shelf operation and claimed highly sat-

isfactory results. The procedure had not been used a great deal in this country.

It can be seen, then, that at best, the foregoing palliative procedures offer only fair results and that there is not entire agreement among various clinics as to the procedure to be followed or as to its simplicity.

Our series consists of 16 cases treated at the Shriners' Hospital for Crippled Children in St. Louis and four cases at the University of Virginia Hospital.

Seventeen were female and three were males.

The youngest patient at the time of operation was 8, the oldest was 18, the average age was 12½ years.

The shortest follow-up was two years after the operation and the longest twelve years after operation.

Five cases were treated by osteotomy of the Schanz type.

Nine cases were treated by shelves.

Six cases were treated by arthrodesis.

The osteotomies were of the Schanz type, but no attempt was made to use the accurate angling of the fragments suggested by Gaenslen. The extremities were immobilized in about 15 degrees of flexion in slight or no abduction.

In the cases having shelves, preliminary traction was used.

The method suggested by Crego,[12] in which a bicycle spoke is passed through the lower end of the femur and continuous and heavy traction applied, was used. Where necessary, the hip flexors and adductors were sectioned and in one case a fasciotomy of the Soutter type was done. At operation the hips were partially transposed anteriorly and a large shelf laid down above the head from the ilium.

In the arthrodesed cases preliminary traction was also used and as much length obtained as possible. Transposition at the time of operation was also attempted and a fusion done by means of a tibial bone graft driven into the neck and shaft of the femur at the distal end and into a trap door above in the ilium. Three of the five cases required later osteotomies in order to place the limb in a more desirable position. The latter was impossible at the time of primary operation.

In later cases not recorded in this series, the fusion procedure has been altered to follow the Hibbs procedure and also a procedure suggested by Dr. J. A. Key in which a large drill is passed through the trochanteric area and the neck of the femur into the ilium. A tibial or femoral graft is then driven into the tract. This procedure seems to have eliminated the necessity for secondary procedures, inasmuch as the graft can be maintained against the ilium with the femur in any desired position.

Results can be tabulated as follows:

Osteotomies: 3 fair results, 2 with poor results
Shelving: 4 good, 4 fair, 1 poor
Arthrodesis: 5 good, 1 poor

All of the cases having the osteotomies showed correction of the lumbar lordosis. The two poor results were due to malposition of the distal fragment. Improvement may be expected from further procedures.

The poor result among the cases having shelves was due to pre-existing degenerative changes in the head. In the four cases showing fair results, there was complaint of easy fatigue, and slight fatigue even in the cases showing good results. The poor result in the case of the arthrodesis was due to incomplete fusion. A secondary procedure should improve this patient's status. None of the patients was bothered with fatigue nor did they find the stiff hip any handicap. An average shortening of two and a half inches was lessened to one and one-fourth inches. Several of the younger cases have had epiphyseal arrests to correct the shortening. All of the twenty cases, even those having poor results, felt that they had had improvement over their original state.

It may be added that the cases for arthrodesis were carefully selected. They were children whose economic background made it fairly certain that they would soon be called upon to support themselves, and in whom a painful hip would be a great handicap. They were all cases of unilateral dislocations.

The only recent reference in the American literature to arthrodesis for dislocated hips was by Kellogg Speed,[13] who recommended its use in unilateral congenital subluxations with maximal shortening in adults where a stable fixed hip was required by the patient's occupation and where shelf operation above with possible retention of the hip motion was neither feasible nor desired.

The primary object of the fusion is to regain as much of the length as possible, to hold this gain in a favorable position, and to eliminate the secondary degenerative changes seen after the other types of operation.

When our cases were reviewed we had no preconceived preference for any type of procedure and we were surprised that the arthrodeses had proven so satisfactory.

We hesitate to draw any conclusions from so small a series of cases. Orthopedic surgeons, however, are familiar with the arthrodesing operation and well know its potentialities. In certain carefully selected cases it has a great deal of value and should be added to the limited list of procedures already used in the treatment of these cases.

CONCLUSIONS

(1) The shelving procedure is not the ideal operation that it is thought to be.

(2) Osteotomies likewise are not ideal, and carry with them complications which often handicap the patient as badly as the original deformity.

(3) Arthrodesis offers a selected group of cases as good, or better prognosis, inasmuch as it seems to eliminate pain and fatigue.

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DISCUSSION (*Abstract*)

Dr. C. H. Crego, St. Louis, Mo.—We all know that sooner or later every untreated or recurrent dislocation of the hip reaches the stage where reduction with motion is impossible. The developmental and structural changes in the head of the femur and acetabulum are such that joint function cannot be restored. In this group of patients we must either let the patient go untreated, thereby leaving him with the outlook of increasingly serious future disability, or else offer him the alternative of the procedures that have been described by Dr. Frankel. It is quite obvious that none of these procedures is ideal, and they are, as he has stated, merely palliative attempts to reduce and not cure the disability.

The irreducible cases fall into two sharply defined groups, namely: the bilateral hips and the unilateral hips, and in discussing the treatment one should keep constantly in mind that the aims of treatment in the two groups are distinctly different. In the bilateral cases, the problem is one of reducing lumbar lordosis and increasing stability with preservation of sufficient motion on both sides. The factor of shortening is not present.

In the unilateral hips, however, shortening is one of the major deformities that must be overcome.

I do not believe that we are ever justified in either group of cases in shelving unreduced hips where they are found. This in no way changes the weight-bearing line in the double hips nor overcomes the shortening in the single hips, and I cannot see that anything is accomplished by it. It would seem, therefore, that the two procedures open to us in the double hips are either one of the many osteotomies that have been described or changing the posterior dislocation to an anterior transposition and turning a shelf over the transposed heads. I thoroughly agree that none of these procedures is a panacea.

In the unilateral cases, I do not believe that osteotomies are indicated and, although the shelf operation will give stability and motion, and if preceded by skeletal traction, will overcome a certain amount of shortening, it has not been proven beyond all doubt that it will prevent the occurrence of late traumatic arthritis with disabling pain. Intra-articular arthrodesis in good functional position will overcome the shortening, will markedly improve the gait, and will eliminate entirely the chance of any future disability due to pain. The one objection, of course, to the arthrodesis is the fact that the patient must put up with a stiff hip, but to me this is far less disabling than an unreduced unilateral dislocation.

The sad part of the picture is that the general public and the medical profession itself permit these dislocated hips to remain untreated until it is too late to reduce them with good joint function. It is sincerely to be hoped that in the not far distant future these unfortunate individuals will be treated early enough to hope for satisfactory reductions. When this occurs, the many operations for the treatment of the neglected cases will fall into discard.

Dr. J. Warren White, Greenville, S. C.—Shortening has been continually mentioned as a factor that must be corrected. I have had three obese ladies, adults in the twenties, who have had painless hips and lordotic but symptomless spines with unilateral dislocation of the hip where the shortening of two and a half or three inches was the chief factor. In those cases I did the overlapping shortening operation, and I think it was decidedly worth while after watching the cases for over five years.

Dr. I. William Nachlas, Baltimore, Md.—I understand the question involved is that of the treatment for the hip that cannot be restored to a normal position. This treatment is designed to make the best of a bad job rather than to produce a normal hip. For this the arthrodesis of the hip is a well-recognized operation, affording excellent stability, and I am in whole-hearted accord with Dr. Frankel in his recommending this op-

eration from the point of view of relatively early results.

The reports of such results in the recent literature likewise substantiate this opinion. There is, however, room for restraining one's enthusiasm in recommending this operation. The patient who does not have treatment for the hip usually gets along fairly well until after 35 or 40, when he begins seeking medical attention because of pain in the back. Very few have symptoms other than the deformity which would make them seek medical attention before senescence begins.

Would it not, therefore, be best to withhold unequivocal recommendation for the fusion operation until after we have had the ultimate results in the statistics? We would then determine if, as the result of the arthrodesis, the backache that would otherwise have developed is avoided; or if, as a result of the fusion of the hip with the increased strain on the back, a backache of another type will ensue. It is to be hoped that Dr. Frankel's studies will be carried on so that a statistical study to solve this point will be made available for us.

Dr. J. Albert Key, St. Louis, Mo.—I want to mention the use of the bone graft in the arthrodesis. Two drill holes one-fourth of an inch in diameter are made through the base of the trochanter along the superior border of the neck of and into the ilium. Square pegs are driven into these holes to pin the bones together. The grafts are cut from the tibia and help to immobilize the hip and stimulate osteogenesis. It is very difficult to immobilize a hip in a plaster cast. The pelvis slips up and down.

In some patients with marked gluteus medius weakness, if the trochanter is transplanted downward on the abducted hip, this will tend to increase power in the gluteus medius. In the anterior transposition the new acetabulum is made by digging into the ilium just below and behind the anterior superior spine.

I have a case in which I made too extensive a shelf. The patient has considerable stiffness because the shelf was too large and covered too much of the head. It is important to get the shelf posterior as well as superior, but not too far anterior.

Dr. Frankel (closing).—Several years ago, Dr. Nachlas may remember, Dr. Bennett, in a meeting in Baltimore, was asked the same question about the arthrodesing operation on the spine. The question arose about fusion of the spine in scoliosis and its relation to the formation of arthritis in later life on the various joints above and below, and also the formation of arthritis in the triple arthrodesis on the cuneiform joints and the formation of arthritis around the ankle from arthrodesing operations about the foot. It is something that we just have not proven. We know that the possibility of arthritis exists, but in going back to our long series of cases in which fusions of the hip were done for other diseases, such as tuberculosis of the hip, we have seen adults ten and fifteen or twenty years after operation who have not shown a great deal of arthritis, and I see no reason why a patient with congenital dislocation should not give at least as good a result ten or fifteen years later after the same type of procedure.

It cannot, of course, be said that the patient will not develop arthritis, but, as you know, many of us get arthritis without the arthrodesis operations, and all of it cannot be blamed upon the arthrodesis procedures.

STUDIES ON HUMAN HYPERSENSITIVITY TO POISON IVY*

By EDMUND L. KEENEY, M.D.
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This past year the City of Baltimore established the first municipal poison ivy clinic. The primary purpose of this clinic was to find suitable methods to decrease compensation disability for poison ivy dermatitis among city employees. Of 326 men who reported to the clinic, 142 (44 per cent) gave a positive history of poison ivy dermatitis. In the positive group, 13 per cent gave a history of having had one or more of the common allergic diseases, and 16 per cent gave a positive family history of poison ivy dermatitis. In the negative poison ivy history group only 2 per cent gave a history of having had one or more of the allergic diseases, and only 5 per cent gave a positive family history of poison ivy dermatitis.

It is impossible to reproduce in writing the contents of the motion picture. The following is a brief abstract of the pertinent facts revealed by each part of the picture.

MOTION PICTURES

Part 1.—The pictures demonstrate the attempt made to discover a substance that would block the experimental poison ivy reaction. Ferric chloride solution, potassium permanganate solution, sodium perborate in vanishing cream, vanishing cream, manganese chloride solution, extract of jewelweed, and rancid butter were used. Ferric chloride solution alone possessed the ability to block the poison ivy reaction.

Part 2.—The methods employed in determining the reacting ability of the skin at different sites on the body in hypersensitive persons are demonstrated. The skin of the abdomen and of the back showed a reacting ability which was better coordinated with the clinical findings and the history (of a hypersensitive person) than that showed by the skin at other sites on the body.

Part 3.—The pictures show that a positive patch test produces a refractory period in the state of hypersensitivity which persists for at least six to eight weeks. The possibility that

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this observation might lead to a simple method of providing protection against poison ivy dermatitis is intriguing.

Part 4.—The absolute effectiveness of a 10 per cent ointment of ferric chloride and the partial effectiveness of a 10 per cent ointment of ferrous sulfate in blocking the experimental poison ivy reaction are shown in the pictures.

From the results of these experimental studies the 10 per cent ointment of ferric chloride should protect clinically against poison ivy dermatitis if it is applied before contact with the poison ivy plant occurs.

SUMMARY AND CONCLUSIONS

In conclusion I should like to point out briefly the practical value of some of our observations.

(1) The reacting ability of the skin at different sites over the body in a hypersensitive individual is not the same. The skin of the abdomen and the back seems to possess a reactivity which is better coordinated with the clinical findings than the skin over the forearms. The skin over the forearm is the site commonly used for patch testing. We might conclude that a negative patch test on the forearm is not a true indication of the state of hypersensitivity until patch tests are made over the skin of the abdomen or back.

(2) We have demonstrated that positive patch tests produce a refractory period in the state of hypersensitivity which persists for two or more months. This method of protecting against disease by producing the typical disease in a small, isolated area, and thereby promoting for the individual a protective mechanism which is known as immunity, is not new in the bacteriologic world, but the application of this principle in the field of poison ivy dermatitis is new. The possibility that this extremely simple method of therapy will replace the objectional injection method of preventive therapy for poison ivy dermatitis is intriguing.

(3) A 10 per cent aqueous solution or ointment of ferric chloride blocks the experimental poison ivy reaction. This solution or ointment might find its greatest practical usefulness in those individuals who knowingly are hypersensitive to the poison ivy plant and whose activities necessarily provoke frequent contact with the plant. I refer particularly to campers and to the employees of cities, counties and states whose work is directed on highways, sewers, parks and gardens. There are criticisms. Ferric chloride will permanently stain clothing. Some cases of permanent pigmentation of the skin have been reported following the use of iron salts in the treatment of poison ivy dermatitis. However, the pigmentation reported to have occurred developed in the skin areas where the epidermis had been denuded by blister of bullous formation at the time the iron preparation was applied. These observations, therefore, do not contraindicate the use of ferric chloride on normal skin which would be the case were it to be used as a preventive measure. I do not wish to imply that the problem of preventing poison ivy dermatitis has been solved. I do believe, however, that the interesting facts which have been uncovered will marshal our thoughts and the thoughts of other investigators into very intriguing fields of research.

DISCUSSION (*Abstract*)

Dr. Leslie N. Gay, Baltimore, Md.—At one of the first meetings of the Society for the Study of Allergy, in 1926, Dr. Spain and Dr. Cooke presented the first publication that pertained to the treatment and diagnosis of Rhus toxicodendron dermatitis. They prepared a 95 per cent alcoholic extract of the dried leaf. Because oxidation set in quickly, they finally arrived at the conclusion that the small amount of water in the extract caused precipitation of some agent which inactivated the material. Therefore, they hit upon the idea of extracting with absolute alcohol and have managed to maintain a rather permanent material. However, it has been our experience that the ether extract prepared by Dr. Caulfield is a more stable and certainly a more potent preparation than the absolute alcohol extract.

The active principle is as yet unknown. Cooke and Spain have felt that it is the oily residue which can be brought down by evaporation of the alcohol.

Oral treatment is questionably successful; in fact, I think one can consider it a failure, but the prophylactic treatment by the injection method is extremely satisfactory. A group of 98 cases were treated by Cooke and Spain with the alcohol extract and 58 of them were free of poison ivy in spite of exposure after a course of eleven injections; 36 showed definite improvement, and four out of the 98 no improvement.

The disappointing feature is that these individuals fail to demonstrate any change in their skin reactivity after the course of treatment. Dr. Keeney did not emphasize the fact that after treatment with the ether extract a number of our patients showed diminished skin reactivity.

There are two outstanding pieces of work which I think deserve mention. One is the publication of Heinbecker, who found that of 65 Eskimos patch-tested with the extract of Rhus toxicodendron not one gave a reaction, and he concluded therefore that contact with the material is necessary before one can consider an individual sensitized. Later, Strauss patch-tested a number of infants with poison ivy extract and found that they failed to react. Then he repatch-tested them after three or four weeks and, much to his surprise, he discovered that a large proportion of them, 72 per cent, gave a positive patch test.

This demonstrated definitely that contact with the material was necessary before sensitivity could be demonstrated.

In 1935, Field and Sulzberger brought to our attention the so-called refractory state which develops in some individuals who have recovered from a contact dermatitis. Re-exposure failed to produce lesions in their patient, even though fairly strong material was brought in contact with his skin.

In our clinic at the Johns Hopkins Hospital the alcoholic extract prepared according to the technic of Cooke and Spain has been heretofore used with excellent results. In 1931, twenty patients between the ages of 4 to 38 years were admitted with moderately severe lesions due to poison ivy. Subcutaneous injections brought about rapid improvement of the symptoms, relieving especially the itching. Daily injections were administered and in every case after the third dose a most satisfactory therapeutic result was recorded. However, from the recent observations of the results from the ether extract it is my impression that we have a more stable and more active material for the diagnosis and treatment of Rhus toxicodendron dermatitis.

Dr. Marion T. Davidson, Birmingham, Ala.—I should like to ask what base you use for the ferric chloride ointment.

Dr. Keeney (closing).—The ointment is prepared as follows: ten per cent ferric chloride, 60 per cent anhydrous lanolin, and 30 per cent vanishing cream. We have tried all kinds of combinations and this seems to represent the most satisfactory ointment.

I have not used the ointment a great deal as a preventative for poison ivy dermatitis, but I have suggested that patients acquire cotton stockings and cotton gloves, soak them in the 10 per cent ferric chloride solution and wear these garments when they anticipate contact with the poison ivy plant. The method has worked beautifully.

I have tried the ointment on a few people. I have suggested that after they put on the treated gloves they apply the ointment over their forearms. Generally in warm weather people do not cover their arms securely enough and there is likely to be some sort of contact with the plant.

All of the individuals to whom I have given this method of prophylaxis have been extremely sensitive to the poison ivy plant, and not one of them has developed poison ivy dermatitis. They have all come in direct contact with the plant.

You will have noticed in the conclusion of the movies that I stressed that "field tests" should be employed in testing the clinical effectiveness of these experimental results. I took a group of 55 men whose exposure to poison ivy I knew was imminent every day; they were men who worked along the highways, in the parks and in the gardens of Baltimore city. These men were given a patch test once every month and followed from early June until early October. Not one of these men developed a serious case of poison ivy dermatitis. Four or five developed mild lesions, which were not significant.

Our results are interesting from the standpoint of decreasing compensation disability. There was considerable compensation disability in Baltimore city from poison ivy dermatitis prior to the establishment of the clinic. Since we have established the clinic and started specific therapy, compensation for poison ivy dermatitis has been a negligible expense.

Question.—Were there any Negroes?

Dr. Keeney.—There were two Negroes in the group. There were many individuals of German, Polish and Italian extraction. I have a tremendous amount of data that I am gradually accumulating, and I am trying to get it in written form. These data will reveal the variation in the positive patch test reaction in individuals of different extraction.

Dr. Ralph Bowen, Houston, Tex.—What is your experience in treating with the antigen by mouth?

Dr. Keeney.—I have never tried it.

TUBERCULOSIS: ITS EVOLUTION AND ITS ERADICATION*

By CHESTER A. STEWART, M.D.
New Orleans, Louisiana

Tuberculosis is a disease characterized by two phases of development. Many of the conspicuous changes peculiar to each of these two developmental stages of the disease can be visualized and traced in the living patient. As a rule, relatively long intervals of apparent quiescence separate the first from the second stage of the evolution of the disease, and this fortuitous circumstance facilitates the recognition of these two dissimilar processes, to which the terms primary tuberculosis and reinfection tuberculosis are usually applied.

By far the most common example of tuberculosis in the primary phase of its development is represented by the apparently well tuberculin sensitive patient whose clinical and x-ray studies fail to reveal foci of disease. In these instances the positive tuberculin reaction proves the presence of tuberculous lesions, but the additional methods now available for examining patients are not sufficiently refined to disclose the site of these lesions. Many of the important characteristic features of the primary phase of the evolution of tuberculosis must be studied, therefore, in the relatively small group of patients with roentgenographically demonstrable primary lesions.

Repeated applications of the tuberculin test have enabled physicians to determine the ap-

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*From the Department of Pediatrics, Louisiana State University School of Medicine.

proximate time the transition from the uninfected to the infected state occurred in a considerable number of instances. Studies of this character combined with analysis of gastric contents for tubercle bacilli have shown that an interval of three to eight weeks separates the first bacillary infection and the subsequent development of sensitivity to tuberculin. Coinciding closely with the time this special sensitivity makes its appearance, recently infected patients usually display the transitory initial fever of tuberculosis. A few of these primarily infected patients develop pulmonary infiltrations which represent the early pneumonic stage of primary tuberculosis. As a rule, these individuals appear to be in excellent health. The paucity of clinical symptoms and physical signs produced even by extensive pneumonic infiltrations representative of tuberculosis in its primary phase of development is indeed remarkable. This rather unique situation doubtlessly accounts for the frequency with which some of the most instructive changes characteristic of the evolution of primary tuberculosis are often overlooked. Owing to this unique feature, the detection of primary tuberculosis requires the application of the tuberculin test as a routine to apparently healthy individuals.

Serial x-ray studies of patients with fresh pneumonic primary infiltrations usually disclose little or no change in the character and extent of the consolidation for a period of several months. Eventually, however, the lesion ordinarily begins to decrease progressively. Insofar as x-ray studies are concerned, this marvelous process of spontaneous resolution leads gradually either to a complete disappearance of the consolidation or to its reduction to relatively trivial fibrosed or calcified deposits. In the latter case the gross features of the process that results in the production of Ghon tubercles can be traced as they occur in the living patient. As a rule, about two years elapse before the resolution of a primary pulmonary tuberculous infiltration is essentially completed. During the period this remarkable repair is taking place the patient usually manifests no evidence of illness. The change observed to occur in pneumonic consolidations of primary tuberculosis is often accompanied by similar changes in the hilus lymph nodes which frequently acquire calcium deposits. In general, the series of changes that leads to the calcification of primary tuberculous lesions represents the successive steps through which the evolution of the primary phase of tuberculosis usually progresses. This first phase of the evolution of the disease includes, therefore, the initial fever of tuberculosis, the acquisition of sensitivity to tuberculin, all of the lesions the first infection produces, and the gradual reduction of these lesions to relatively small fibrosed or calcified foci of disease.

If tuberculosis never progressed beyond the primary phase of its evolution the serious clinical conditions we designate by the terms chronic ulcerative pulmonary tuberculosis, bone and joint tuberculosis, miliary tuberculosis, renal tuberculosis, tuberculous meningitis, and a long list of other important varieties of the disease would be unknown to man. Since it is the second phase of the disease that produces fatal and contagious forms of tuberculosis, study of the changes that lie beyond the primary phase of the evolution of the disease is important.

The clinical recognition of the second phase of evolution of tuberculosis is facilitated by the fact that apparently quiescent intervals of considerable length usually separate this stage from the primary stage of the development of the disease. Thus studies, including serial x-ray examinations, have frequently succeeded in demonstrating the development of tuberculous pulmonary lesions in tuberculin sensitive patients whose previous serial roentgenograms were negative or revealed nothing but calcified lesions throughout follow-up periods of 1, 5, 10 or 15 years. In these instances the known antecedent presence of tuberculin sensitiveness and x-ray evidence limited either to normal lungs or to calcified primary tuberculous lesion, combined with the later development of new tuberculous infiltrations, constitute the detailed information by which the new lesions are identified as representing the second or postprimary phase of the development of tuberculosis. Additional follow-up studies occasionally disclose the resolution and disappearance of these reinfection foci of disease. In most instances, however, the infiltration representing the second phase of the evolution of tuberculosis as it occurs in the lungs displays a strong tendency to increase in size, to cavitate, to produce germ-laden sputum, to cause symptoms of increasing severity, and to result in death in many instances. In general, therefore, the customary progress of the second phase of the evolution of pulmonary tuberculosis is diametrically opposed to that characteristic

of the primary phase. The latter tends to resolve, whereas the former tends to progress.

Detailed information which has demonstrated that the antecedent presence of primary tuberculosis may be followed at a later date by the development of bone and joint tuberculosis, miliary tuberculosis, tuberculous meningitis, and tuberculosis of serous membranes shows that these clinical varieties of the disease can be placed in the same class with chronic ulcerative pulmonary tuberculosis. All of these serious conditions exemplify the second phase of the evolution of tuberculosis as it occurs in specialized organs and parts of the body. It is the disturbance in the specialized functions of the different tissues and organs involved that accounts for a considerable share of the complex and varied clinical picture the second developmental stage of tuberculosis produces in man.

A correct differentiation between the first and the second phase of the development of the disease is of great practical importance. When the disease is correctly identified as primary in character the physician can usually give a good prognosis and can abstain from special therapy. If, however, the available information definitely identifies lesions as representing the second stage of the disease, this identification immediately places the patient in the more serious group that needs very close attention relative to treatment.

The differentiation between these two phases of the disease is materially simplified when detailed information is available. If serial tuberculin tests show that the development of lesions coincided with or shortly followed the acquisition of sensitiveness to tuberculin, these facts serve to identify the demonstrable lesions as representing tuberculosis in its primary phase of development. Furthermore, when tuberculous infiltrations make their appearance in tuberculin sensitive patients, who were known over a long time not to be suffering from clinical disease, the antecedent knowledge aids in identifying these new areas of disease as postprimary or reinfection in character. The differential between the first and second stages of tuberculosis is often facilitated, therefore, by antecedent information derived from serial tuberculin tests and clinical and x-ray studies.

Confusion as to terminology is created by the occasional infections that progress to death in a relatively short time. Many investigators classify these patients as examples of progressive and fatal primary tuberculosis. I prefer to limit the term primary tuberculosis to the benign changes that usually accompany the transition from uninfected to the infected state, and to apply the term reinfection tuberculosis to the more malignant changes that usually postdate primary tuberculosis by months and years. Accordingly, I am inclined to classify patients who die shortly after they acquire their first infection with tubercle bacilli merely as instances in which the transition from the first to the second stage of the evolution of tuberculosis occurred without an appreciable interval separating these two processes. This interpretation seems to be helpful in that it preserves a clear-cut distinction between primary and reinfection tuberculosis without permitting variations in the time interval that separates these two stages of the disease from clouding the distinction made between them.

Since serious clinical varieties of tuberculosis develop in tuberculin sensitive patients it is obvious that an infection with tubercle bacilli cannot be relied on to prevent the disease. Apparently the eradication of tuberculosis is contingent mainly upon the universal application of prophylactic measures that prevent infection.

A great contribution to the solution of our tuberculosis problem can be made if the members of the Southern Medical Association unite in a concerted effort to discover and segregate the open cases of tuberculosis now at large in their respective groups of patients. Perhaps it is advisable to supply each household unit with the protection provided by a thorough tuberculosis survey which includes:

(1) The routine application of the tuberculin test to the entire membership of each household unit for the purpose of identifying the infected and the uninfected members of the group.

(2) The clinical, laboratory and x-ray studies of the infected tuberculin sensitive members of each family unit for the purpose of detecting patients with open tuberculosis.

(3) The segregation of open cases until their disease ceases to be contagious.

During the past few years I offered this type of service to my private patients. The program resulted in the application of initial and follow-up tuberculin tests to a total of 5,145 children and adults. This survey disclosed tuberculous infection in 1,266 patients, or 24.6 per cent of the group. When clinical and x-ray studies were made on these tuberculin sensitive

patients, 60 examples of chronic pulmonary tuberculosis were discovered. The results of this modest survey show that a tremendous contribution to the control of tuberculosis will be made by the Southern Medical Association when all of its members include an anti-tuberculosis program in their private practices. In order to hasten the eradication of tuberculosis I suggest that this Association adopt an official program and give it vigorous support. When this is done human tuberculosis in the South will be eradicated to the same degree that bovine tuberculosis was eradicated in this part of the United States.

DISCUSSION (*Abstract*)

Dr. Horton Casparis, Nashville, Tenn.—Through much more extensive tuberculin testing we are taking advantage of an available tool to get a more comprehensive picture of the extent of tuberculous infection and of tuberculosis. This is essential in ultimate control. But in addition, the tuberculin test is an excellent attention-getter, and without attention education is impossible, and without education control is impossible.

Routine tuberculin testing by the pediatrician may be criticized by some and may be called a racket, but it is fundamentally sound as an infection or tuberculosis-finding approach, and also is very important as a means of education. In my opinion, probably the greatest value which has come from routine immunizations has been the gradual education of the public to the realization that there is a terribly important relatively new field in medicine, namely, that of prevention. The proper use of the tuberculin test can help greatly to produce a widespread realization of this same picture with regard to tuberculosis.

When does the primary complex end and re-infection begin? I, myself, have never been able to make this distinction in the human being. Once I said this to an outstanding tuberculosis pathologist, and he said: "Oh, yes, I think we can." I said: "When and how?" He said: "At the autopsy table." I told him I thought that was rather late for those interested in the control of tuberculosis.

Of course, some day we might be able to make this differentiation, and further accumulation of knowledge is very important, but today we are too apt to say "primary complex" if they get well and "re-infection type" if they do not. The point of all this is that I feel that if one has tuberculosis, about all that we can be sure of in any particular instance is that that individual at some time or other got enough tubercle bacilli in his body to make him sick. How many times he was infected and how many bacilli it took to make him sick, nobody knows. If he is sick we had better use much of our energy in trying to get him well, rather than using too much of it "chewing the insoluble rag" about what type he has.

Dr. John W. Scott, Lexington, Ky.—While my work is not in pediatrics, I should like to ask Dr. Stewart how he performs the tuberculin test, if time permits.

Dr. L. J. Moorman, Oklahoma City, Okla.—I am ready to agree with Dr. Casparis that the question often arises, when we try to differentiate primary and secondary infection, do we know? I have tried for many years to clarify my own thinking with reference to primary and secondary conditions in tuberculosis, and I think, as you have seen demonstrated here, there is that difference in the picture in many cases that is apparently very clear, and yet we see cases, just as Dr. Casparis has pointed out, where apparently a primary infection goes right on to cavitation, demanding the same sort of treatment that secondary infection demands.

The important thing for us is to recognize tuberculosis, if possible, from the very beginning, and to watch the patient very closely and treat the disease when indications arise, whether it is secondary or primary.

Dr. Samuel A. Anderson, Jr., Richmond, Va.—I should like to ask Dr. Stewart what he would recommend with regard to the care of these children who are apparently well and whose lung findings are picked up more or less incidentally. Does he consider them a menace to other children?

Dr. Stewart (closing).—Complete tuberculin testing data and follow-up studies, including x-ray examinations, are helpful in differentiating primary and re-infection tuberculosis. When the appearance of tuberculous lesions coincides with the acquisition of sensitiveness to tuberculin by patients who recently reacted negatively to this material, the lesions can be identified with reasonable certainty as representing primary tuberculosis. When new, previously undemonstrated lesions make their appearance months or years subsequent to the time the patient became sensitive to tuberculin, these new lesions can be identified with reasonable certainty as representing the postprimary or re-infection stage of the disease. However, when lesions are discovered in patients for whom we have no antecedent information relative to the time relationship between the acquisition of sensitiveness and the development of these lesions the differential diagnosis must, of necessity, be based on follow-up studies. If these studies reveal a consistent paucity of physical findings and clinical manifestations and disclose the gradual spontaneous resolution of infiltrations, which leads either to their disappearance from the roentogram or to the reduction to relatively trivial fibrosed or calcified deposits, the condition may be diagnosed as representing primary tuberculosis. If, however, antecedent information is lacking and follow-up studies disclose a tendency for the lesions to progress, to cavitate and to cause increasing symptoms, the conditions may be diagnosed with reasonable certainty as representing the re-infection phase of tuberculosis. Considerable time is lost in making this differential diagnosis when complete information derived from repeated tuberculin tests and indicated x-ray studies is not available.

The recognition of the two phases of development which characterize the evolution of tuberculosis is made possible by the fact that the primary and the reinfection stages of the disease are usually separated from one another by long intervals of time, during which no clinical manifestations of the disease can be detected. These two developmental stages of tuberculosis are not two separate diseases. Instead, they are merely two phases in the development of one disease, namely, tuberculosis. In displaying successive phases of development tuberculosis resembles lues.

The value of differentiating primary from re-infec-

tion tuberculosis resides in the fact that primary tuberculosis is a relatively benign stage of the disease which seems to need no special therapy aside from bed rest throughout the period the initial fever and a rapid sedimentation rate are present. The reinfection phase of the disease demands the use of collapse therapy, orthopedic appliances, surgery, and so forth. Furthermore, the outlook is good for primary tuberculosis, but it is grave for re-infection tuberculosis.

Methods available for diagnosis are not sufficiently refined to permit the detection of the exact point at which the disease ceases to be primary and enters its re-infection phase of development. Fortunately, complete follow-up studies show that months or years usually separate the clinically important transition point between these two developmental stages of the disease. Adequate re-examinations made during this interval that usually bridges the time that separates primary from re-infection tuberculosis will often result in the recognition of the second stage of the disease months before it becomes hopelessly extensive. In general, the lesions that accompany the acquisition of sensitiveness to tuberculin can be regarded as representing the relatively benign primary phase of the disease, whereas other tuberculous lesions that make their appearance months or years subsequent to the time the patient became sensitive to tuberculin can be regarded as representing the post-primary or re-infection stage of the disease. By applying the test periodically to those who have reacted negatively to tuberculin the results of this test provide an important clue in the differential diagnosis of tuberculous lesions. Additional clues can be derived from periodic x-ray studies of infected patients which reveal lesions whose appearance postdated the presence of sensitiveness to tuberculin. The re-infection tuberculosis may be endogenous or exogenous in origin.

Confusion in interpreting tuberculosis is created by the occasional primary infection which is followed by the death of the patient in a relatively short time. Many investigators attribute these deaths to progressive primary tuberculosis. I prefer to classify patients who die shortly after they acquire their first infection with tubercle bacilli as instances in which the re-infection stage of the disease complicated the fresh early stage of primary tuberculosis rather than the old stage of primary tuberculosis. This interpretation seems helpful to me in that it preserves the commonly seen, clear-cut distinction between primary and re-infection tuberculosis and it does not permit short intervals of time separating the two stages of the disease to cloud the general distinction that is usually made between them.

My preference is for the Mantoux test. Thousands of physicians never use tuberculin and in order to get them in the habit of using some form of tuberculin test regularly I am in favor of recommending that each physician select the material and technic that he may prefer. Primary tuberculosis is a relatively unimportant source of contagion. If it were contagious every tuberculin-sensitive child and adult would be a menace to his immediate family and other associates. I believe that it is the re-infection type of pulmonary tuberculosis with positive sputum that perpetuates the disease. Primary tuberculosis lays the foundation for this eventuality.

THE MANAGEMENT OF DERMATITIS HERPETIFORMIS*

By J. LAMAR CALLAWAY, M.D.
Durham, North Carolina

Since the original description of the clinical syndrome known as dermatitis herpetiformis by Duhring[1] in 1884, there have been numerous etiologic theories advanced for its diagnosis and many therapeutic measures advocated for its treatment, but at no time has there been found a single specific etiologic agent acceptable to all, nor any therapeutic measure which is universally successful.

I shall not at this time go into any morphologic description of dermatitis herpetiformis for the clinical appearance of the disease varies with the character of the predominating lesion, although the various types possess certain features in common. The several variations and clinical types have been well covered in the literature and the histopathology has likewise been described adequately.

The diagnosis, however, is not always simple and for matters of treatment and prognosis, it is important that pemphigus, impetigo herpetiformis, erythema multiforme, drug eruptions and other vesiculo-bullous eruptions be carefully eliminated. Criteria listed below should definitely establish the diagnosis, although not all need be present in a single case.

CRITERIA FOR DIAGNOSIS OF DERMATITIS HERPETIFORMIS

(1) Grouping of polymorphous lesions (vesicles and bullae usually are present but not always)

(2) Usual absence of mucous membrane lesions

(3) Pruritus almost invariably present

(4) Usual symmetrical distribution

(5) Pigmentation

(6) Usual absence of Nikolski's sign

(7) Positive iodide test by ingestion (exacerbation of lesions) (Jadassohn, 1912)

(8) Positive iodide patch test, 20-50 per cent potassium iodide (Jessner and Hoffman, 1925)

(9) Fairly good prognosis for life. Chronic course with exacerbations and remissions

(10) Phytopharmacologic index, 69-70 per cent (Pelsmacht, 1929)

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*Read in Section on Dermatology and Syphilology, Southern Medical Association, Thirty-Fifth Annual Meeting, St. Louis, Missouri, November 10-13, 1941.

*From the Section of Dermatology and Syphilology, Department of Medicine, Duke University School of Medicine, Durham, North Carolina.

As in most conditions, if the etiology were clear-cut, a therapeutic attack should be more successful. Sternberg and I[2] have recently reviewed the many theories that have been advanced as to the causes of dermatitis herpetiformis, including its relation to pemphigus and the so-called "transition" cases. These theories can be divided into four main classes, namely: infectious, toxic, virus (neurotrophic) and endocrine. None of these will completely explain all cases. Sternberg and I feel that bacterial allergy should be added to the above theories. This viewpoint seems substantiated by the observations of Fellner and de Vasconcellos,[3] Peck,[4] Pillsbury[5] and others.

In addition to the cases previously reported I have had occasion to study two other patients in whom foci of infection played a definite role. One patient, a 31-year-old white male, could always associate an exacerbation of his dermatitis herpetiformis with a flare-up of a chronic gallbladder disease which he had. After Lyon drainage, in which a *Staphylococcus aureus* and anaerobic mixture were cultured from his gallbladder, he was found to be sensitive to these organisms and under vaccine desensitization therapy satisfactory relief was obtained. A second patient, a 37-year-old white man, suffering from an almost constant chronic tonsillitis, had a flare-up at the time of removal of his tonsils. Culture of the removed tonsils revealed alpha hemolytic streptococci, *Staphylococcus aureus* and an anaerobic mixture. A vaccine was prepared and when he was found sensitive to them, bacterial desensitization was begun, which with local treatment, previously ineffective, controlled his disease.

I do not suggest or claim that all patients suffering with dermatitis herpetiformis will be improved by removal of foci of infection or by bacterial desensitization with organisms removed from infected foci, but in certain cases this method of attack should be carefully tried as an adjunct to the usual therapeutic measures which I shall presently discuss.

The search for foci of infection should include a careful survey of the nasopharynx, teeth, tonsils and paranasal sinuses. Even Thornwald's bursae, ordinarily inconspicuous, should be investigated. The lungs (chronic bronchitis), gallbladder, prostate and pelvic organs in women should be carefully studied.

The local measures used in treating dermatitis herpetiformis are multitudinous. Almost all types of ointments, lotions, wet dressings, baths and combinations have been used, each affording relief of symptoms in individual cases. Every dermatologist has his own preparation with which he alleviates annoying symptoms and sequelae and I shall certainly not presume to change his successful therapy of these symptoms.

Certain of the more technical and unusual therapeutic methods deserve attention. Germanin has been tried by Scherber[6] and many others with little success. I personally feel that the inherent dangers of germanin outweigh its therapeutic potentialities. Steiner,[7] using intravenous sodium thiosulfate therapy advocated by Wirtz, reported success in four cases, but most observers have been disappointed with its use. Roussel had used chromium sulfate with good results. Various forms of arsenic, both organic and inorganic, frequently offer the single best approach to the problem, but their use should be very carefully controlled because of the inherent dangers of arsenic. Patients soon learn that arsenic is beneficial and, despite their physician's advice to the contrary, continue taking arsenic with oftentimes serious sequelae. Alderson has had good results with hyperpyrexia by means of baths.

The foregoing comment or the therapeutic approach that I shall outline below is no attempt to report all therapeutic measures, but is, in my opinion, a rational attack on a chronic therapeutically recalcitrant disease.

(1) All medications containing iodides or bromides should be assiduously avoided.

(2) Iodized table salt should be interdicted, since even the small amount of iodine present may be sufficient to cause continued activity.

(3) Search for and remove all foci of infection. This necessitates careful roentgenographic study of teeth, sinuses, lungs, and oftentimes consultation with the urologist, gynecologist and otolaryngologist.

(4) Culture of infected foci, preparation of autogenous vaccine, and when found sensitive to the organisms isolated, bacterial desensitization.

(5) Sulfonamides, particularly sulfathiazole and sulfadiazine, sometimes prove extremely beneficial, but our experiences with them so far have been too few to enable us to make any definite claims for them. Certainly, they will prove efficacious in some cases in which infection plays a role.

(6) Local antipruritics such as the following lotion may be helpful:

Menthol	0.4
Phenol	2.4
Chloral hydrate	12.0
Cal. lotion	240.0

Sig. Sop on for itching

Equal parts of olive oil and calamine lotion may be used in patients with extremely dry skin.

(7) Five to 10 per cent sulphur ointment as advocated by Duhring may be used. Excoriated or infected lesions may be treated with a mild ammoniated mercury ointment.

(8) Starch baths, sulphur baths, potassium permanganate baths, or other baths may alleviate symptoms.

(9) The controlled administration of arsenic sometimes offers the only effective measure for controlling the intense pruritus.

(10) Sodium thiosulfate intravenously, quinine, chromium sulfate, germanin, grenz therapy, or other measures not included in this brief review have proved helpful in other hands and may be used to advantage in certain patients.

TECHNIC OF SKIN TESTING AND ADMINISTRATION OF VACCINE

After the autogenous vaccine has been prepared in the usual manner, the patient is tested for sensitivity by injecting 0.1 c. c. of each saline suspension of organisms intracutaneously into the forearm. If either an immediate allergic wheal appears in fifteen minutes or a delayed tuberculin-like reaction in twenty-four hours, the patient is considered to be sensitive to the organisms in question.

The organisms to which the patient reacts should be mixed together and diluted 1:10, 1:100, 1:1000, and in extremely sensitive cases, 1:10,000.

Desensitization is begun using the highest dilution, the patient receiving 0.1 c. c. subcutaneously for the first dose. This is followed by 0.2 c. c. forty-eight hours later. The dosage is increased by 0.1 c. c. every other day until 1 c. c. has been reached. Then the next most concentrated dilution is begun and the vaccine administered as outlined above.

If the patient shows any increase in temperature or marked redness at the site of the injection following the administration of any given dose, the vaccine should be diluted or the dosage in the same dilution significantly reduced and started again, observing the same precautions as before.

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DISCUSSION (*Abstract*)

Dr. Richard L. Sutton, Jr., Kansas City, Mo.—Descriptions of craw craw, an African itching disorder known to be due to filarial infestation, certainly corresponds with dermatitis herpetiformis. On this surmise as to the nature of Duhring's disease, I have tried fuadin in two cases in which sodium cacodylate had not given relief. Both responded well to the antimonyl preparation.

I made a number of sections of a biopsy specimen from dermatitis herpetiformis and found no microfilaria, but they might not be present in skin highly reactive to them, just as in sarcoid you do not find tubercle bacteria. If any of you had a case in hospital that you could follow or if you were fortunate enough to obtain an autopsy on a patient with a disease that is not fatal, I should certainly like to know if you can find any worms in them. Microfilariae are sometimes discoverable in the night and not during daytime.

Dr. Richard S. Weiss, St. Louis, Mo.—Dermatitis herpetiformis to us is not a disease *per se*. It is a symptom of something going on within the body. A certain percentage of the cases apparently are caused by a defect in protein metabolism. Between 20 and 30 per cent of the patients that we see with dermatitis herpetiformis are benefited by an extremely low protein diet, sometimes an extremely low protein diet accompanied with the use of arsenic. The arsenical drug that we have found most satisfactory is iron cacodylate given intravenously. It can be given in much larger doses than we had hitherto supposed. There seems to be no harm in giving one grain daily for a week or two and continuing for quite some time three times a week. In no case in which we have used these larger doses has any arsenical eruption or evidence of arsenical neuritis been observed. It is an extremely safe arsenical drug to employ.

Another fact that I should like to point out is that dermatitis herpetiformis-like eruptions, clinically indistinguishable from dermatitis herpetiformis, may be the precursor of blood dyscrasias. For instance, we have seen Hodgkin's disease that began as dermatitis herpetiformis. The remarks of the other speakers this evening have indicated that other internal conditions may be a factor, focal infection in particular.

So I and those who have been associated with me, and under the teaching of Dr. M. F. Engman, Sr., have always considered that this was a disease of internal origin with multiple etiologic factors that must be sought and eradicated.

AN IMPROVED SKIN CLIP*

By NICHOLAS A. SCHNEIDER, A.B., M.D.
St. Louis, Missouri

The improvement of the Michael skin clip which the writer herewith submits consists simply in making a fold in the center of that part which comprises the back of the clip. It is possible to cut through this fold or hump on the back of the clip with an ordinary side-cutting wire snip. After this part has been cut through the clip is divided into two pieces which fall apart and can be picked up. To remove the ordinary Michael clip it is necessary to insert the tip of the clip-remover between the clip and the patient's skin. This procedure is generally painful and sometimes difficult. To remove the clip here described it is not necessary to insert an instrument between the clip and the patient's skin. No pain, therefore, is experienced by the patient while the clip is being removed. In all other respects the clip here presented is used in the same manner as the Michael clip.

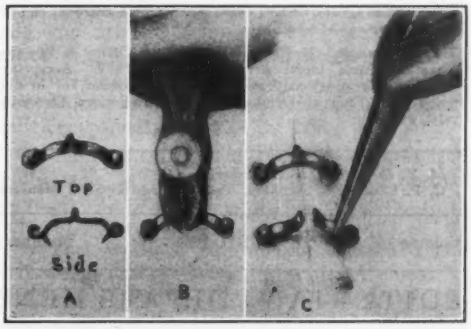

Fig. 1
Improved Skin Clip
(A) Side and top elevations of clip; (B) Fold being cut; and (C) Clip after fold has been cut through.

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EDITORIAL DEPARTMENT

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WOUNDED AT PEARL HARBOR

The medical profession may well be proud of the results of treatment of the wounded at Pearl Harbor after the Japanese attack. A first-hand account of the work is given by Dr. John J. Moorhead[1] of New York City, who chanced to reach Pearl Harbor on December 3 to give a course of lectures to the Honolulu Medical Society on traumatic surgery. He had given two lectures before December 7, when the attack occurred.

Upon arrival of a large number of wounded soldiers at a military hospital in Honolulu, they were sorted, given morphine when needed and tetanus toxoid if an extensively muscled area was injured. All had received the standard dose of tetanus toxoid on entry into military service. Shock was treated by transfusion of whole blood, liquid plasma, or infusion of saline-dextrose solution. Wounds were cleansed with soap and water, debrided, hemostasis secured and sulfanilamide or sulfathiazole placed in the wound which was left open for three days. As part of the aftercare, a gram of a sulfonamide was given every four hours for three days.

No tetanus ensued and there was no gas gangrene death. There was practically no purulent exudate from the wounds. There was no empyema of the chest. The postoperative mortality was 3.8 per cent, chiefly in the intra-abdominal group and among those depleted by shock and hemorrhage.

Moorhead adds that the facts that the attack occurred early Sunday morning, while the men were clean and not war worn, and that most of them reached the hospital within six hours of injury, contributed to the low mortality.

This is a remarkable record for the first large scale American medical work of the war.

1. Moorhead, John J.: Surgical Experience at Pearl Harbor. J.A.M.A. **118**:712 (February 28) 1942.

PHOSPHORUS AND FRACTURES

When one thinks of material for bone healing one thinks of calcium and phosphorus, chief elements of the frame work of this tissue. Control of these is effected perhaps primarily by the parathyroid glands, which may cause deposit or urinary excretion of the two elements, and may raise or lower their level in the circulating blood.

Bone and joint surgeons would like to devise a means of increasing the concentration of these elements about the site of a fracture. It has been noted that the erythrocyte contains much more of a particular form of available phosphorus than does the blood plasma. Phosphatase is an enzyme concerned in the utilization of phosphorus, and the phosphatase of a fracture callus increases as the fracture begins to heal, three or four days after an injury. An infected fracture or an old ununited fracture may have a somewhat reduced amount of this enzyme, though, according to Armstrong and associates[1] at the University of Minnesota, lack of phosphatase is not the cause of slow healing. The Minnesota workers consider it possible that lack of phosphorus itself in proper chemical form, rather than lack of the enzyme, delays healing. They therefore have investigated the result of providing extra quantities of phosphoric acid ester in cases of fresh fracture.

Rabbits, in which the long bone of the foreleg had been experimentally fractured, received daily intravenous injections of sodium beta glycerophosphate over a period of one to two weeks.

Roentgenograms revealed a larger callus about the fractures of the injected animals than in the

1. Armstrong, W. D.; Sperling, Louis; and Litow, Sidney: Effect of Phosphoric Acid Esters on Fracture Healing. Proc. Soc. Exper. Biol. and Med. **49**:169 (February) 1942.

controls, and at autopsy the callus was seen to be larger and firmer than in the controls. Healing appeared to have progressed further in the treated animals. Serum inorganic phosphorus and calcium were the same in the experimental animals and in the controls. The form of phosphorus employed, sodium beta glycerophosphate is reported to be nontoxic over a considerable dosage, and safe for further experimentation.

Increase in dietary ingestion of phosphorus, with administration of parathormone might provide similar conditions of elevated blood phosphate.

Clinically, measures of speeding the rate of healing of fractures, aside from correct splinting, are those which improve the general health, well-being and comfort of the patient.

VITAMINS IN LEUKOCYTES

The normal liver in many species is a storehouse for vitamin A. Hence the therapeutic use of codliver oil and the other fish liver oils. A diseased liver may or may not contain vitamin A, depending upon the disease. Livers made fatty by certain diets or toxic agents may remain rich in A. Livers made fatty by choline deficiency[1] are poor in A, although the kidneys of the same animals may be rich in this vitamin. Variations in A concentration in different tissues in health and disease are a subject worthy of systematic investigation.

Certain vitamins are apparently selectively concentrated in the white blood cells. Gorham, Abels, Robins and Rhoads,[2] of New York City, have investigated the quantity of thiamin (B_1) in the red and white blood cells. Red and white cells and platelets were separated from plasma and from each other by sedimentation and fractional centrifuging. Thiamin and a product of thiamin metabolism were detefmined separately in red cells and in white, and in urine before and after a considerable quantity of vitamin B_1 was administered.

It was noted that the white cells normally contain about ten times as much thiamin as do the red cells. Similarly, the white cells contain more B_2 and C than do the red. This is consistent, the observers say, with the fact that leukocytes have a much higher respiratory rate than have red cells, and these three vitamins function as essential parts of a respiratory reaction. They should naturally be concentrated where respiration is greater.

Intravenous injection of thiamin is followed by a rise of its concentration in both white cells and urine, and usually by increased utilization of this vitamin. The white cell apparently selectively and rapidly ingests B_1 from the blood. The white blood cell level reflects the thiamin deficiency or saturation of the body.

In the leukemias, the thiamin level of the white cells is about three times the normal average. In the red cells, in leukemia, it is twice the average normal for red cells. The New York workers[3] believe that thiamin is not well utilized in leukemia. Its derangement is perhaps part of the chemical pathology of leukemia.

It is interesting that the three types of white cells, which are present in abnormally large numbers in the three types of leukemia, are alike in their tendency to abnormally high thiamin content. This is a change which may have followed or preceded the increase in number of the white cells, study of which may throw further light upon the development of the disease.

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TWENTY-FIVE YEARS AGO

From Journals of 1917

Wilson's Second Term.[4]—American ships, flying American flags, have been sunk by German submarines. American citizens have been killed in the ruthless and inexcusable warfare on American commerce by a nation that disregards treaties and defies international laws. There is no escaping the conclusion that Germany is waging war against the United States; and it only remains for President Wilson and Congress to declare that we are in a state of war with the Prussian monarchy. * * * It is probable that a million or more men will be called into service at once; * * * from this time the United States must maintain a large army and navy as a matter of self-protection, and if she would play her part in a league of nations to maintain peace. The region of the country known as the South * * * will send its best and noblest physicians and surgeons to the medical service of the Army and Navy in this hour of greatest need * * * last November * * * of the 25,000 physicians needed for the Officers' Reserve Corps only 2,026 had enlisted.

4. Editorial. The Need for Medical Officers in the Army and Navy. Sou. Med. Jour. **10**:360 (April) 1917.

Beards.[1]—The French mustache and goatee have long become as symbolic of the race as have the mutton-chop side-whiskers of the Englishman; and it must look queer indeed to see the former all deprived of their hirsute insignia of manhood, for the French government is said to have issued an order to its soldiers: "Shave your faces clean." * * * Another serious blow to wearing beards was the overwhelming vote of the citizens of the United States to place a clean shaven man in the White House, thus demonstrating the danger of whiskers for candidates.

Urban Public Health.[2]—At Birmingham, especial emphasis is being placed upon the enforcement of all the health regulations, and an anti-spitting campaign is being planned.

Florida Irregulars.[2]—The members of the Electic Board of Medical Examiners of Florida have been impeached and dismissed from office by the Governor of the State. The reason given for the action of Governor Catts is the alleged issuing of bogus diplomas and licenses.

1. Editorial. Beards as Disease Carriers. South. Med. Jour. **10**:82, 1917.
2. Southern Medical News. Ibid. p. 366.

Book Reviews

Diseases of the Blood and Atlas of Hematology. With Clinical and Hematologic Descriptions of the Blood Diseases Including a Section on Technic and Terminology. By Roy R. Kracke, M.D., Professor of Bacteriology, Pathology and Laboratory Diagnosis, Emory University School of Medicine, Atlanta, Georgia. Second Edition. Thoroughly Revised, Reset, and Enlarged. 692 pages, illustrated. Philadelphia: J. B. Lippincott Company, 1941. Cloth $15.00.

With new title and binding, Dr. Kracke's book appears in its second edition four years after the first publication. It has grown in bulk by a third of the original number of pages and presents notable additions and enlargements in the text and illustrations. New chapters have been incorporated, the original text in many places amplified, additional color plates have been provided and the bibliography has been brought uptodate. Such evidences of the author's industry and earnestness are of a piece with the original freshness and vigor of the work. One is impressed by the honesty with which the more difficult problems of hematology are handled. As regards cytology, for example, we are given the conventional criteria governing the identification of cell types and are provided beautiful color plates as aid, yet after pages devoted to the monocyte and monocytic leukemia we are informed with disarming directness that under actual trial the best trained hematologists have disagreed widely on their identification of a given cell. In view of the present uncertainties as to cell lineage and relationships, such frankness is commendable. The same directness appears in the more general considerations of blood diseases. While deferring to the accumulated experience of other students the text constantly reflects the author's own personal experience and conclusions. Whether or not the reader agrees with all such conclusions they are at least set forth for his deliberate consideration.

A new chapter on the treatment of leukemia is contributed by Dr. Lloyd Craver. It summarizes briefly and clearly the present status of radiation therapy including that by the recently introduced radioactive phosphorus. Present trends of interest are reflected in the additional amount of space devoted to the bone marrow and to the very live topic of blood transfusion with its associated problems of the blood bank and the preservation, storage and use of whole blood and plasma. A final section deals with hematologic technics.

The publishers have made of the volume a beautiful example of the bookmaker's art. The color plates, of which there are many, are a delight to the eye while the contrasting matte surface of the printed page makes for easy reading. This is a useful and informative hand book.

Synopsis of Materia Medica, Toxicology, and Pharmacology, For Students and Practitioners of Medicine. By Forrest Ramon Davison, B.A., M.Sc., Ph.D., M.B., Assistant Professor of Pharmacology in the School of Medicine, University of Arkansas, Little Rock. 633 pages, illustrated. St. Louis: The C. V. Mosby Company, 1940.

Dr. Davison has briefly given the essential information about drugs in his book. He has classified drugs according to their site of action and their therapeutic activity. The first pages contain short discussions of the basic principles of pharmacology, materia medica, prescription writing and toxicology. A large number of prescriptions are given which the physician will find valuable. An excellent book.

Neuroanatomy. By Fred A. Mettler, A.M., M.D., Ph.D., Professor of Anatomy, University of Georgia School of Medicine, Augusta, Georgia. 476 pages, illustrated. St. Louis: The C. V. Mosby Company, 1941. Cloth $7.50.

This book has two outstanding features rarely seen in neuroanatomic texts. There is a complete and comprehensive presentation of the venous system of the brain and spinal cord. Also in addition to the usual myelin sheath serial sections, there is side by side a nissl cell stain of the same section. This feature is rare in English texts. The text is profusely illustrated and is well written.

MacLeod's Physiology in Modern Medicine. Edited by Philip Bard, Professor of Physiology, Johns Hopkins University School of Medicine. Ninth Edition. 1256 pages, illustrated. St. Louis: The C. V. Mosby Company, 1941. Cloth $10.00.

MacLeod's Physiology in Modern Medicine, in its ninth (1941) edition, has been largely rewritten by a distinguished group of scientists to bring to the student insofar as possible the most recent additions in the rapidly changing knowledge in this fundamental field of basic medical science. Chapters on the closely bordering fields of physiologic chemistry and pharmacology have been arranged in their proper relative positions. The general plan and purposes of the book and the collaborators in the publication of the eighth edition have been retained and they have been joined by Howard J. Cur-

tis, who has rewritten the chapters on electrical excitation and conduction of the nerve impulse, and by Walter S. Root, who has contributed a chapter on the urinary bladder. The bibliography and index have been improved and many new figures introduced. Altogether, it is a most excellent textbook for the undergraduate student and the practitioner as well. The use of a nonglare paper and excellent typography contribute to the comfort of its study.

Skin Grafting. From a Personal and Experimental Viewpoint. By Earl Calvin Padgett, M.D., F.A.C.S., Professor of Clinical Surgery, University of Kansas School of Medicine, Kansas City, Kansas. 149 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1942. Cloth $4.50.

Dr. Padgett presents a very thorough study of the technic of skin grafting. He traces the development of the science of grafting and discusses each type of graft, its uses and its limitations. His resourcefulness is brought out in Chapter 6, which contains the description of his dermatome. This instrument makes comparatively easy the removal of grafts of any desired thickness from practically any part of the body.

The excellent presentations will be of interest not only to those specializing in reconstructive surgery, but to all those practicing general and industrial surgery as well. The bibliography, which covers five pages, traces the progress of skin grafting. The book fills a long felt need for a monograph on this subject.

Professional Adjustments. I. By Gene Harrison, A.B., R.N., Educational Director, Druid City Hospital School of Nursing, Tuscaloosa, Alabama. 204 pages. St. Louis: The C. V. Mosby Company. Cloth $2.25.

This book is intended to help the student nurse make the change from the easy going high school or college atmosphere to that of the professional group in which she becomes a tyro. The chapter on guarding the speed has a number of good anecdotes which effectively emphasize the ideas. Each chapter has a large bibliography. The volume can be read with profit by any nurse.

Public Health Administration in the United States. By Wilson G. Smillie, A.B., M.D., Dr.P.H., Professor of Public Health and Preventive Medicine, Cornell University Medical College, New York City. Second Edition. 553 pages. New York: The Macmillan Company, 1940. Cloth $3.75.

In this edition the administrative procedures of disease control and the important work of public health agencies in nutrition are reviewed. The developments in public health which followed the Social Security Act are discussed. This book has proven valuable in the past especially to public health administrators and those interested in public health work.

Exercises in Electrocardiographic Interpretation. By Louis N. Katz, A.B., M.D., Director of Cardiovascular Research, Michael Reese Hospital, Chicago. 222 pages, illustrated. Philadelphia: Lea & Febiger, 1941. Cloth $5.00.

This little book is meant entirely as a companion to the larger volume, which has already been reviewed. The latter begins at the beginning and furnishes an adequate foundation for interpretation. The smaller book on "Exercises" is for the more advanced student of the subject and presupposes a knowledge of the fundamentals as contained in the preceding volume. The "Exercises" are therefore of value only to the individual who already possesses a reasonably comprehensive knowledge of the subject.

Clinical Aspects of the Electrocardiogram. By Harold E. B. Pardee, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical College, New York. Fourth Edition, Revised. 434 pages, illustrated. New York: Paul B. Hoeber, 1941. Cloth $5.75.

This is a new edition of one of the best known books on the electrocardiogram. The high standard of previous volumes is maintained. The new material naturally deals particularly with information which has been accumulated in recent years as the result of the use of precordial leads. The section on localization of infarctions and on changes produced by conditions such as pericarditis, pneumonia and pulmonary embolism, which may simulate infarction, is excellent.

The author properly emphasizes that electrocardiographic signs which are of statistical prognostic value when applied to large groups of patients may be useless or even misleading in individual patients. He points out that the electrocardiogram is only one method of examination of the heart and that its value is greatly limited unless the procedure is correlated with the result of other methods of examination.

The purpose of the book is not to discuss the purely clinical aspects of heart disease. Nevertheless, the value of the book would be considerably enhanced if, in the section dealing with arrhythmias, there were a more detailed discussion of the bedside diagnosis of these conditions. One of the chief purposes of the electrocardiogram is to allow the physician to check his clinical impression over a period of years and, hence, to enable him to develop enough skill to interpret irregularities accurately with the stethoscope alone. It is hoped that in future editions more emphasis will be placed on this point.

Cardiac Classics. A Collection of Classic Works on the Heart and Circulation with Comprehensive Biographic Accounts of the Authors. Fifty-two Contributions by Fifty-one Authors. By Fredrick A. Willius, M.D., M.S. in Med., Chief, Section of Cardiology, The Mayo Clinic, and Thomas E. Keys, A.B., M.A., Reference Librarian, The Mayo Clinic. 858 pages, illustrated. St. Louis: The C. V. Mosby Company, 1941. Cloth $10.00.

This book should bring joy to the soul of any internist who has an interest in the cultural background of his chosen field. The first chapter presents a brief summary of more important contributions during the past 300 years. The remainder of the book is concerned with a reproduction of the outstanding publications on the heart, these being presented in the authors' words. Each discussion is preceded by a bibliographic sketch. The series begins with Harvey and ends with Herrick.

Among the classical writings which are made readily available by this volume are those of Hales on blood

pressure, Morgagni on valve lesions and aneurysm, Auenbrugger on percussion, Heberden on angina pectoris, Withering on digitalis, Laennec, Hope, Stokes, Flint, Traube, Potain, Broadbent, Aschoff, Mackenzie and many others. An attempt has been made to select from each author those passages which represent his most important contribution to the science of cardiography. In general, the selections have been happily made. One may be inclined to regret, however, that in the case of Sir James Mackenzie the discussion of auricular fibrillation has been selected rather than one of the classic passages in which he emphasizes the importance of the response to effort as a test of the heart.

Obviously, it was not possible for the authors to include within the pages of one volume all of the classic descriptions. However, one or two omissions seem particularly regrettable. Thus, Bright's description of cardiac hypertrophy in regard to renal disease should certainly have been included, as well as Starling's classical presentation of the "law of the heart." It is hoped that in future editions these will be added and also excerpts from the writings of Sir Thomas Lewis and of Emanuel Libman on endocarditis.

These sins of omission are minor. The authors have performed an important service in making available in one book so much historic material for students of heart disease. Every physician and medical student who has not already done so should read Heberden's description of angina pectoris, Harvey's presentation of his experiments, and for that matter, most of the material in this book.

Cardiac Clinics. By Fredrick A. Willius, B.S., M.D., M.S. in Med. Head of Section of Cardiology, Mayo Clinic, and Professor of Medicine, Mayo Foundation for Medical Education and Research, Graduate School University of Minnesota, Rochester, Minn. 276 pages, illustrated. St. Louis: The C. V. Mosby Company, 1941. Cloth $4.00.

This little book presents very little new information. It contains a discussion of a large number of individual patients with cardiac disease and gives in detail specific information about the problems involved in the diagnosis and treatment of these particular patients. In a work of this type it is obviously impossible to cover a general topic in a comprehensive manner. The book cannot therefore be expected to replace the standard volumes on the heart. The information which it contains, though necessarily limited, is critically evaluated and accurately presented.

The Heart in Pregnancy and the Childbearing Age. By Burton E. Hamilton, M.D., Cardiologist, since 1921, to The Boston Lying-In Hospital, Boston, Massachusetts and K. Jefferson Thomson, M.D., Associate Physician, Metropolitan Life Insurance Company Sanatorium, Mount McGregor, New York. With a Section Entitled "Delivery and Obstetrical After-Care of Cardiacs." By Frederick C. Irving, M.D., F.A.C.S., Professor of Obstetrics, Harvard Medical School. 402 pages. Boston: Little, Brown & Company, 1941. Cloth $5.00.

For twenty-one years the senior author has been interested in the problems of the heart in relation to pregnancy. The book reflects this deep and continued interest and its theoretical application to clinical problems. It is filled with statistics based upon an unusually extensive personal experience.

The second section, which is concerned with the physiology of the circulation in pregnancy, presents a crystallized review of most of the important advances made in this field during the past decade. The authors properly emphasize the necessity for an understanding of the physiology of pregnancy, if one is to comprehend the changes in the physical signs over the heart which occur in normal pregnant women. They show how the increased cardiac work of pregnancy leads to the typical phenomena of the overactive heart, with increase in rate, intensification of sounds, and the appearance of systolic murmurs. The physician needs to be thoroughly familiar with these normal signs before he can begin to attempt evaluation of cardiac abnormalities in the pregnant woman.

In the opinion of the reviewer this volume offers the best discussion of the subject in the English language.

Obstetrics. By Hervey Clock Williamson, M.D., F.A.C.S., Associate Clinical Professor of Obstetrics and Gynecology, Cornell University Medical College, and George Schaefer, M.D., Assistant Attending Surgeon in Gynecology Clinic, St. Luke's Hospital. 113 pages. New York: Oxford University Press, 1941. Cloth $2.00.

The usefulness of this outline of obstetrics is confined to the student who wishes to orient his knowledge and to the practitioners who wish a concise exposition of signs, symptoms, diagnosis and treatment for quick reference.

Principles of Microbiology. By Francis E. Colien, B.S., M.S., Ph.D., F.A.P.H.A., Associate Professor of Bacteriology and Preventive Medicine in the Creighton University School of Medicine, Omaha, and Ethel J. Odegard, R.N., A.B., M.A., Instructor in Sciences Applied to Nursing, College of Saint Teresa, Winona, Minnesota. 444 pages, illustrated. St. Louis: The C. V. Mosby Company, 1941. Cloth $3.00.

This textbook of bacteriology is primarily intended for the instruction of student and graduate nurses. It is complete enough yet brief enough to be covered in the time allotted for instruction in bacteriology.

The paper used in printing is pale green and pleasing to the eye in reading. The illustrations are numerous and most of them are good. The inclusion of a chapter on preparation of media, laboratory exercises and a glossary add to the usefulness of the book.

Allergy in Clinical Practice. By Staff-Members of the Cleveland Clinic Under the Direction of Russell L. Haden, M.D., F.A.C.P., Chief of the Medical Division. Edited by J. Warrick Thomas, M.D., F.A.C.P., Chief of the Section on Allergy. 354 pages, illustrated. Philadelphia: J. B. Lippincott Company. Cloth $5.00.

Allergy in this book is stressed not as an entity but as a factor in general medicine, a condition which requires meticulous consideration in the differential and final diagnosis.

The physician is taught how to approach the problem of the allergic patient and the different manifestations which are found of this chemical disease. A num-

ber of case histories are used to illustrate the text. "As approximately 50 per cent of the population suffers from allergy," one readily sees the importance of this study. It gives clear cut descriptions that enables the physician to aid in the partnership of controlling the patient's allergy.

Plain Words About Venereal Disease. By Thomas Parran, M.D., Surgeon General, U. S. Public Health Service, and R. A. Vonderlehr, M.D., Assistant Surgeon General, U. S. Public Health Service. 226 pages. New York: Reynal & Hitchcock, 1941. Cloth $2.00.

This is a book for the public which borders on the sensational. This is perhaps understandable when one considers the problems of the venereal diseases and the difficulty in making the public realize their importance in peace and in national defense. The problem is outlined and efforts at control are told. The role of the citizen and local authorities is stressed and special mention is made of the efforts of the Wisconsin State Health Department. Other communities are condemned for their lack of appreciation of the dangers of this scourge. It is a book which should cause embarrassment, determination and action.

Wounds and Fractures. A Clinical Guide to Civil and Military Practice. B. H. Winnett Orr, M.D., F.A.C.S. Lincoln, Nebraska. Chief Surgeon, Nebraska Orthopaedic Hospital. 225 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1941. Cloth $5.00.

This book is intended to consider a series of fracture cases grouped by problem as well as by regions to describe certain successful technics.

It is filled with timely practical suggestions which may prove very important in the present national emergency. The details of Orr's procedures are described. There is some repetition which might have been avoided. The author disapproves of ice tongs and wires for traction and insists that the pins he uses will hold securely in the cast and in the bones, preventing the rocking motion which attends the use of smaller sized wires and the ice tongs.

This book is especially recommended to men who have done a large amount of orthopaedic surgery.

Trauma and Disease. Edited by Leopold Brahdy, B.S., M.D., Physician in Charge of Occupational Diseases and Injuries in the Office of the Corporation Counsel of the City of New York, and Samuel Kahn, B.S., M.D. Medical Examiner in the Bureau of Workmen's Compensation of the Department of Labor, State of New York. Second Edition. 655 pages, illustrated. Philadelphia: Lea and Febiger, 1941. Cloth $7.50.

The rapidly growing social and legal implications of the etiologic relationship between trauma and disease have forced upon us the need for wider and more accurate knowledge. The rising accident rate, the compensation laws, the growth of preventive and industrial medicine have all served to focus attention upon this subject.

The purpose of this book is to present the accumulated knowledge concerning the relationship of a single trauma to disease, to indicate the limitations of this knowledge and to develop the underlying principles upon which in any given case the medical opinion should be based. Conditions which are obviously caused by single trauma, sprains, fractures, lacerations are not included, nor are those diseases discussed (except incidentally) which may be related to trauma. The subject of this volume is the effect of a single trauma either physical or psychic in producing disease or influencing its course.

International Health Division. Annual Report, 1940. 247 pages, illustrated. New York: The Rockefeller Foundation.

The international health division reports increased interest in the virus diseases and that several new viruses have been isolated. Continued studies are being made of yellow fever, influenza, with a suggested nomenclature of influenza virus A and virus B, tuberculosis, syphilis, rabies; in which an epidemic occurring among foxes in Georgia has been shown to have affected about one-third of the heads sent into the laboratory; malaria and several other diseases. Also the work of various health departments which they find is aiding is given.

Southern Medical News

ALABAMA

The Medical Association of the State of Alabama will hold its next annual meeting in Montgomery, at the Whitley Hotel, April 21-23.

Dr. George A. Denison, Birmingham, who has been serving as Acting Heath Officer for Birmingham and Jefferson County, was recently appointed Health Officer by the Board of Health. Dr. Denison has been connected with the Health Department of Jefferson County since June, 1921.

Deaths

Dr. Oscar Johnson, Pike Road, aged 75, died recently of senility.

Dr. Harry John Krudop, Mobile, aged 70, died recently of myocarditis and cirrhosis of the liver.

Dr. William Walter McTyeire, Birmingham, aged 67, died March 10.

ARKANSAS

Arkansas Medical Society will hold its next annual meeting at Hot Springs National Park, April 27-29.

Boone County Medical Society has elected Dr. M. E. Rust, Harrison, Secretary-Treasurer.

Carroll County Medical Society has elected Dr. J. H. Bohannan, Berryville, President; Dr. D. C. Roberts, Fayetteville, Vice-President; and Dr. A. L. Carter, Berryville, Secretary-Treasurer.

Clay County Medical Society has elected Dr. N. J. Latimer, Corning, President; Dr. O. H. Clopton, Rector, Vice-President; and Dr. J. R. McGuire, Piggott, Secretary-Treasurer.

Dallas County Medical Society has elected Dr. H. A. Cheatham, Princeton, President; Dr. W. P. Ward, Fordyce, Vice-President; and Dr. J. E. M. Taylor, Sparkman, Secretary-Treasurer.

Greene County Medical Society has elected Dr. W. E. Ellington, President; Dr. J. J. Hudgins, Vice-President; and Dr. W. McD. Lamb, Secretary-Treasurer, all of Paragould.

Jackson County Medical Society has elected Dr. E. L. Watson, Newport, President; Dr. G. K. Stephens, Newport, Vice-President; and Dr. J. B. Ivy, Tuckerman, Secretary-Treasurer.

Lee County Medical Society has elected Dr. C. W. Chaffin, Moro, President, and Dr. N. C. Hodge, Marianna, Secretary.

Randolph County Medical Society has elected Dr. J. W. Ryburn, Pocahontas, President; Dr. J. E. Smith, Reyno, Vice-President; and Dr. M. A. Baltz, Pocahontas, Secretary-Treasurer.

Fifth Councilor District Medical Society has elected Dr. S. A. Thompson, Camden, President; Dr. H. A. Carrington, Magnolia, Vice-President; and Dr. David LeVine, El Dorado, Secretary-Treasurer.

Dr. C. H. Lutterloh, Hot Springs National Park, was installed President of the Mid-South Postgraduate Medical Assembly at the recent meeting in Memphis, Tennessee, and Dr. J. A. Moore, El Dorado, was elected Vice-President for Arkansas.

Dr. J. W. Butts, Helena, and Dr. B. H. Hawkins, Mena, have been appointed Examiners for the Selective Service.

Dr. John Stathakis, formerly with the State Hospital, Little Rock, has accepted a position with the Pine Bluff ordnance plant as Resident Physician.

Dr. Geo. B. Fletcher, Hot Springs National Park, has been elected Chairman of the Board of Directors of the State Hospital for Nervous Diseases.

Dr. Gilbert Dean, Little Rock, has been appointed Surgical Chief of the State Hospital for Nervous Diseases.

Dr. J. H. Burge, Lake Village, has been elected a Fellow of the International College of Surgeons.

Dr. Paul Gray, Batesville, has been elected a member of the American Heart Association.

Dr. C. C. Hanchey, DeQueen, has been called to active duty as Lieutenant, Medical Corps, U. S. Army, and assigned to Station Hospital, Camp Crowder, Missouri.

Dr. W. W. Johnston, Fort Riley, has been promoted to Captain, Medical Corps, U. S. Army.

Dr. Elizabeth D. Fletcher, formerly with the Arkansas State Hospital, has opened offices in the Donaghey Building, Little Rock, for the practice of psychiatry and neurology.

Dr. H. T. Smith, McGehee, has been reelected Chief of Staff at the Dermott Municipal Hospital.

Deaths

Dr. Alphonse Francis Pernique, Little Rock, aged 47, died February 2.

DISTRICT OF COLUMBIA

International Medical Club, Washington, has elected Dr. P. S. Constantinople, President; Dr. M. W. Perry, Dr. Edmund Horgan and Dr. Gregory Birdsall, Vice-Presidents; Dr. Fred A. J. Geier, Secretary; Dr. Joseph Horgan, Treasurer; and Dr. Henry L. Darner, Historian.

Dr. Roy Lyman Sexton, Washington, has been reappointed Chairman of First Aid and Water Safety of the American Red Cross of the District of Columbia. Dr. Donald H. Leeper will serve as one of the co-chairmen.

Dr. Fred O. Coe, Washington, will serve as Vice-President of the Washington Academy of Sciences, representing the Medical Society.

Dr. Winfred Overholser, Washington, has been elected President of the Washington Institute of Mental Hygiene, and Dr. Benjamin F. Weems, Treasurer.

The Army Medical Library, Washington, is the recipient of the medical library of the late Dr. Sigard Adolphus Knopf, of New York City.

Dr. Lucius F. Badger, Surgeon, U. S. Public Health Service, Washington, has been assigned as Assistant Director of the National Institute of Health, Bethesda, Maryland. For a time after joining the U. S. Public Health Service he was Director of the U. S. Leprosy Investigation Station at Honolula, Hawaii.

Deaths

Dr. Myer Jerome Herschman, Washington, aged 47, died recently.

Dr. David A. Lane, Washington, aged 82, died recently of bronchopneumonia.

FLORIDA

Florida Medical Association will hold its next annual meeting at the Palm Beach Biltmore Hotel, Palm Beach, April 13-15.

Florida East Coast Medical Association, at its fourteenth annual meeting, held recently elected Dr. T. C. Kenaston, Cocoa, President; Dr. Lloyd J. Netto, West Palm Beach, First Vice-President; and Dr. I. M. Hay, Melbourne, Secretary.

Bay County Medical Society has elected Dr. M. F. Parker, President; Dr. J. Powell Adams, Vice-President; and Dr. W. C. Roberts, Secretary-Treasurer, all of Panama City.

Brevard County Medical Society has elected Dr. Grambow Thomsen-von Colditz, Cocoa, President; Dr. G. E. Christie, Titusville, Vice-President; and Dr. I. K. Hicks, Melbourne, Secretary-Treasurer.

Broward County Medical Society has elected Dr. Elbert McLaury, Hollywood, President; Dr. David W. Harris, Fort Lauderdale, Vice-President; and Dr. O. C. Brown, Fort Lauderdale, Secretary-Treasurer.

Columbia County Medical Society has elected Dr. H. S. Howell, President, and Dr. T. H. Bates, Secretary-Treasurer, both of Lake City.

Dade County Medical Society has elected Dr. T. O. Otto, President; Dr. Robert T. Spicer, Vice-President; Dr. Herbert Eichert, Secretary; and Dr. Ralph Sappenfield, Treasurer, all of Miami.

Franklin-Gulf County Medical Society has elected Dr. Thomas Meriwether, Wewahitchka, President; Dr. L. H. Bartee, Port St. Joe, Vice-President; and Dr. J. R. Norton, Port St. Joe, Secretary-Treasurer

Lake County Medical Society has elected Dr. Louis R. Bowen, Eustis, President; Dr. H. Spurgeon Cherry, Center Hill, Vice-President; and Dr. Clyde F. Bowie, Leesburg, Secretary-Treasurer.

Lee County Medical Society has elected Dr. Harvie J. Stipe, President; Dr. H. Quillian Jones, Vice-President; and Dr. A. Louis Girardin, Secretary-Treasurer, all of Fort Myers.

Madison-Suwannee County Medical Society has elected Dr. Eustace Long, President, and Dr. E. D. Thorpe, Secretary-Treasurer, both of Madison.

Manatee County Medical Society has elected Dr. L. W. Blake, President; Dr. W. D. Sugg, Vice-President; and Dr. M. M. Harrison, Secretary-Treasurer, all of Bradenton.

Marion County Medical Society has elected Dr. B. S. Stutts, Dunnellon, President; Dr. E. G. Lindner, Ocala, Vice-President; and Dr. T. Hartley Davis, Ocala, Secretary-Treasurer.

Monroe County Medical Society has reelected Dr. Harry C. Galey, President, and Dr. William R. Warren, Secretary, both of Key West.

Orange County Medical Society has elected Dr. Spencer Folsom, Orlando, President; Dr. T. E. McBride, Apopka, Vice-President; Dr. Edgar Hitchcock, Orlando, Secretary; and Dr. Hollis Ingram, Orlando, Treasurer.

Palm Beach County Medical Society has elected Dr. James R. Sory, President; Dr. William H. Weems, Vice-President; Dr. David W. Martin, Secretary; and Dr. Frederick K. Herpel, Treasurer, reelected, all of West Palm Beach.

Putnam County Medical Society has elected Dr. J. Worth Brantley, Grandin, President, and Dr. Allen P. Gurganious, Palatka, Secretary-Treasurer.

St. Johns County Medical Society has elected Dr. W. D. Webb, President; Dr. R. D. Harris, Vice-President; Dr. Charles C. Grace, Secretary; and Dr. Herbert E. White, Treasurer, all of St. Augustine.

Seminole County Medical Society has elected Dr. C. L. Park, President; Dr. George H. Putnam, Vice-President; and Dr. Orville L. Barks, Secretary-Treasurer, all of Sanford.

Taylor County Medical Society has elected Dr. J. C. Ellis, President, and Dr. C. A. O'Quinn, Secretary-Treasurer, both of Perry.

Walton-Okaloosa County Medical Society has elected Dr. Arthur G. Williams, Lakewood, President, and Dr. Ralph B. Spires, Defuniak Springs, Secretary-Treasurer.

Washington-Holmes County Medical Society has elected Dr. N. J. Dawkins, President, and Dr. B. W. Dalton, Secretary-Treasurer, both of Vernon.

A one-story health center building will be erected in Starke at an estimated cost of $33,000, this being a Defense Public Works project.

Dr. Lauren M. Sompayrac, Jacksonville, was recently elected a Diplomate of the American Board of Dermatology and Syphilology.

Lieut. Cecil E. Miller, Medical Corps, Sarasota, on duty at Tilton General Hospital at Fort Dix, New Jersey, has been promoted to rank of Captain.

Dr. Daniel Forney Hoke Murphey and Miss Martha Virginia Mann, both of St. Petersburg, were married recently.

Dr. Simon Eugene Driskell and Miss Tallulah Scruggs Turner, both of Jacksonville, were married in St. Augustine, February 20.

Deaths

Dr. Henry Bacon, Jacksonville, aged 85, died February 8.

Dr. Zannie Brantley, Grandin, aged 64, died February 6.

Dr. Arthur Thomas Hudson, St. Petersburg, aged 69, died recently.

Dr. Eugene Keene Jaudon, Miami, aged 74, died recently of myocardial insufficiency and coronary arteriosclerosis.

Dr. William Osenbach, Orlando, aged 73, died recently of acute pyelonephritis, uremia and carcinoma.

Dr. Julius Eugene Salsbury, St. Petersburg, aged 86, died recently of cerebral hemorrhage.

Continued on Page 40

Constipation in Infancy

Constipation in infancy probably commands the physician's attention more often than any other symptom that points to the need of readjusting a feeding formula.

Constipation is a common complaint and oftentimes is the real reason for a slow gain in weight, restless nights and a fretful, uncomfortable baby.

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GEORGIA

Bulloch-Candler-Evans Counties Medical Society has elected Dr. R. L. Kennedy, Metter, President; Dr. John Mooney, Statesboro, Vice-President; and Dr. W. E. Simmons, Metter, Secretary-Treasurer.

Butts County Medical Society has elected Dr. B. F. Akin, President, and Dr. R. L. Hammond, Secretary-Treasurer, both of Jackson.

Clayton-Fayette Counties Medical Society has elected Dr. J. R. Wallis, Lovejoy, President; Dr. T. J. Busey, Fayetteville, Vice-President; and Dr. Y. R. Coleman, Jonesboro, Secretary-Treasurer.

Dooly County Medical Society has elected Dr. L. H. Bishop, Unadilla, President, and Dr. M. L. Malloy, Vienna, Secretary-Treasurer.

Dougherty County Medical Society has elected Dr. P. L. Hilsman, President; Dr. F. E. Thomas, Vice-President; and Dr. I. M. Lucas, Secretary-Treasurer, all of Albany.

Emanuel County Medical Society has elected Dr. J. H. Chandler, President; Dr. D. D. Smith, Vice-President; and Dr. R. C. Franklin, Secretary-Treasurer, all of Swainsboro.

Hall County Medical Society has elected Dr. C. G. Butler, President; Dr. B. B. Chandler, Vice-President; and Dr. H. H. Lancaster, Secretary-Treasurer, all of Gainesville.

Hancock County Medical Society has elected Dr. Horace Darden, President, and Dr. H. L. Earl, Secretary-Treasurer, both of Sparta.

Meriwether County Medical Society has elected Dr. W. P. Kirkland, Manchester, President; Dr. C. E. Irwin, Warm Springs, Vice-President; and Dr. R. B. Gilbert, Greenville, Secretary-Treasurer.

Mitchell County Medical Society has elected Dr. J. C. Brim, Pelham, President; Dr. J. G. Crovatt, Camilla, Vice-President; and Dr. D. P. Belcher, Pelham, Secretary-Treasurer.

Richmond County Medical Society has elected Dr. J. Z. McDaniel, President, and Dr. H. P. Harrell, Secretary-Treasurer, both of Augusta.

Rockdale County Medical Society has elected Dr. P. J. Brown, President, and Dr. H. E. Griggs, Secretary-Treasurer, both of Conyers.

South Georgia Medical Society (Berrien-Clinch-Cook-Echols-Lanier-Lowndes Counties) has elected Dr. T. C. Williams, Valdosta, President; Dr. L. R. Hutchinson, Adel, Vice-President; and Dr. Ashley Bird, Valdosta, Secretary-Treasurer.

Tri-County Medical Society (Calhoun-Early-Miller Counties) has elected Dr. C. K. Sharp, Arlington, President, and Dr. W. H. Hall, Blakely, Secretary-Treasurer.

Taylor County Medical Society has elected Dr. S. H. Bryan, Vice-President, and Dr. R. C. Montgomery, Secretary-Treasurer, both of Butler.

Warren County Medical Society has elected Dr. H. B. Cason, President; Dr. F. L. Ware, Vice-President; and Dr. A. W. Davis, Secretary-Treasurer, all of Warrenton.

Whitifeld County Medical Society has elected Dr. G. L. Broaddrick, President; Dr. G. H. Little, Vice-President; and Dr. H. J. Ault, Secretary-Treasurer, all of Dalton.

Georgia Baptist Hospital, Atlanta, has elected to its medical and surgical staff: Dr. Hal M. Davison, President; Dr. H. W. Minor, First Vice-President; Dr. M. C. Pruitt, Second Vice-President; Dr. B. L. Shackleford, Secretary-Treasurer; and Dr. George W. Fuller to membership on the Executive Board.

Warren A. Candler Hospital, Savannah, will add a new twenty-five-bed addition with equipment at an estimated cost of $93,398, this being a Defense Public Works project.

Continued on Page 42

Chicago Eye, Ear, Nose & Throat College
Established 1897
231 W. Washington St., Chicago, Ill.

Practical postgraduate course in Ophthalmology and Otolaryngology.

Doctors admitted at any time for review and clinical observation.

OSCAR B. NUGENT, M.D., Director

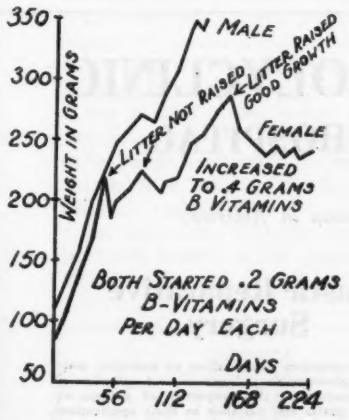
A VITAMIN PROPHESY

During the time of the Caesars, Martellus Bromaeus, on taking charge of the Roman Military Surgeons' Academy, said:

"Do not assume for one single moment that we know all and everything about the human body and its functions. In fact, we know very little, and we have to keep searching without cessation for new scientific facts. I can tell you right here that the human body can not get along without an abundance of the substances which are so richly found in nature and probably some others which we might not be able to see or guess. A time will come when these mysterious substances will be known to physicians so that they can be put to their best therapeutic use."—A. Kronfeld, "History of Medicine."

With all the brilliant work to separate "vitamin B" into the heat affected B_1 and heat resisting B_2, and then into some of their parts—thiamin, riboflavin, nicotinic acid, pantothenic acid, pyridoxine—all in the vitamin B complex has not yet been separated.

Dried grain grown brewers' yeast remains the standard for the whole vitamin B complex, both in laboratory research and in medicine where the physician or scientist wants to be sure.



Showing the only known full vitamin B complex test. Vitamin Food Company's Dried Brewers' Yeast was used.

Be Sure With Vitamin Food Company's Dried Brewers' Yeast

Vitafood Dried Brewers' Yeast, Green Label, with the hop taste unremoved, and the Red Label with the hop taste removed—millions of pounds have gone into the pellagra sections—are trusted sources of the full vitamin B complex, not only in pellagra, but whenever the physician wishes to be sure of the full B complex, and with the concentrated parts to adequately make up the other missing parts.

The biological feeding test shown in the chart was made with Vitafood Dried Brewers' Yeast. Note that more of the B vitamins are needed for raising the litter.

Samples for clinical or professional use will be sent on request, including the yeast in tablet form.

VITAMIN FOOD COMPANY, INC.
VITAMIN RESEARCH LABORATORIES, INC.
122 Hudson Street New York, N. Y.

Continued from Page 40

Dr. Spotswood Douglas Stoddard, Savannah, and Miss Marjorie Hornbeak, Fort Pierce, Florida, were married recently.

Dr. Hugh Edward Hailey and Miss Claire Ridley Hunnicutt, both of Atlanta, were married recently.

Deaths

Dr. Gustave V. Canning, Athens, aged 71, died recently.

Dr. S. Thomas Ellis, Claxton, aged 73, died recently.

Dr. R. J. Clower, Morven, aged 69, died recently.

Dr. E. Newton Campbell, Americus, aged 92, died recently.

Dr. J. B. Bagley, Waresboro, aged 76, died recently of myocarditis and nephritis.

Dr. Berry W. Fite, Resaca, aged 80, died recently of heart disease.

Dr. Alton Bowie Reddick, Sylvania, aged 56, died recently.

KENTUCKY

Caldwell County Medical Society has elected Dr. J. M. Moore, President; Dr. B. K. Amos, Vice-President; and Dr. W. L. Cash, Secretary, reelected, all of Princeton.

Calloway County Medical Society has elected Dr. E. L. Garrett, President; Dr. Hal Houston, Vice-President; and Dr. J. A. Outland, Secretary-Treasurer, all of Murray.

Fleming County Medical Society has elected Dr. C. L. Garr, President; Dr. O. A. Gray, Vice-President; and Dr. Roy Orsburn, Secretary-Treasurer, all of Flemingsburg.

Jefferson County Medical Society has elected Dr. B. W. Smock, President-Elect; Dr. Pat R. Imes, First Vice-President; Dr. Lee Palmer, Second Vice-President; Dr. A. D. Kennedy, Secretary; and Dr. Ben H. Hollis, Treasurer, all of Louisville.

Letcher County Medical Society has elected Dr. E. G. Skaggs, Fleming, President; Dr. O. F. Kleckner, McRoberts, Vice-President; and Dr. Carl Pigmen, Whitesburg, Secretary.

Kentucky Psychiatric Association has elected Dr. William K. Keller, Louisville, President; Dr. J. D. Reichard, Lexington, President-Elect; Dr. Abraham Wikler, Lexington, Vice-President; and Dr. Louis M. Foltz, Lakeland, Secretary-Treasurer.

Plans are under way to construct a log cabin on the site of the former Crawford home, to be designated the Jane Todd Crawford Memorial. A deed has been secured to a plot of ground on the farm with a road leading to it from the highway known as the Jane Todd Crawford Trail, the highway leading from the Crawford farm in Green County to the McDowell home in Danville. A replica of the Crawford log cabin on the farm will be erected and when cabin is completed an appeal will be made for funds to purchase furniture and finance landscaping. It is planned to turn the property over to the State Park Commission.

Dr. Andrew B. Colley, formerly of Dixon, is the new Health Officer in Grayson County, dividing his time between Grayson and Hart Counties, with headquarters in Leitchfield. Dr. Colley succeeds Dr. George B. Davis who will move to Connecticut. Dr. Edwin Bruce Underwood, Evarts, has been placed in charge of the Webster County Health Department to succeed Dr. Colley.

Dr. Leonard A. Crosby, Elkton, has been placed in charge of the health units in Lyon, Trigg and Caldwell Counties.

Dr. C. Noel Hall, Somerset, and Miss Ola Livingston Strickland, Salisbury, North Carolina, were married recently.

Deaths

Dr. Henry W. Heuser, Louisville, aged 76, died recently of a skull fracture received in a fall.

Dr. L. O. Smith, Harlan, aged 64, died recently following a heart attack.

LOUISIANA

Louisiana State Medical Society will hold its next annual meeting in New Orleans, April 27-30.

Plans are being made to construct a $348,000 office building at Baton Rouge as announced by Dr. C. L. Mengis, President of the Louisiana State Board of Health, the building to be completed in about a year. This building will contain the central laboratories of the State Department of Health, including the biological and chemical laboratories in addition to office space for all the division and section heads and for their departments.

Continued on Page 44

THE NEW YORK POLYCLINIC

MEDICAL SCHOOL AND HOSPITAL

(ORGANIZED 1881)

(The Pioneer Post-Graduate Medical Institution in America)

Roentgenology

A comprehensive review of the physics and higher mathematics involved, film interpretation, all standard general roentgen diagnostic procedures, methods of application and doses of radiation therapy, both x-ray and radium, standard and special fluoroscopic procedures. A review of dermatological lesions and tumors susceptible to roentgen therapy is given, together with methods and dosage calculation of treatments. Special attention is given to the newer diagnostic methods associated with the employment of contrast media such as bronchography with Lipiodol, uterosalpingography, visualization of cardiac chambers, perirenal insufflation and myelography. Discussions covering roentgen departmental management are also included.

Plastic Reparative Surgery

The course comprises examination of patients; tests, models and photographs; diagnosis and selection of method of correction; the properties of various orders of skin grafts and variance in their application; bone, cartilage and nerve grafts; readjustments and replacements; fresh wound treatment; pre-operative care; anesthesia; operative procedures; wound closing and minimum scar; follow-up and infection problems; keloids. The course covers the field of correction of disfigurements and replacement of traumatic loss and congenital deficiency. Exposition of cases, lectures and cadaver demonstrations.

FOR INFORMATION ADDRESS

MEDICAL EXECUTIVE OFFICER, 345 West 50th Street, NEW YORK CITY

Diabetic Diets

FREE: *Booklet giving Sample Diabetic Menus, with 33 pages of Delicious Knox Gelatine Recipes*

We have compiled a booklet which may save you time and trouble in the prescribing of diets for your diabetic patients. It is called "Feeding Diabetic Patients—Young and Old."

The booklet contains a brief discussion of the principles of diabetic feeding, practical tables of food composition, sample menus, and 33 pages of simple, economical and attractive recipes calculated for composition and caloric value.

The use of Knox Plain (Sparkling) Gelatine is explained, with examples of how it can give variety to appetizing "full-sized" meals while meeting the diabetic prescription. (Knox is about 85% to 87% protein—entirely free of sugar.) It contains a majority of the food amino acids and has been shown to supplement protein of nearly every variety of food.

Also included in this booklet are typical dietary prescriptions representing Normal Carbohydrate Maintenance, Restricted Carbohydrate High Fat, Diabetic Reducing and Children's Diabetic diets.

The coupon below will bring you as many of these diet booklets as you require, without obligation.

Do not confuse KNOX PLAIN (Sparkling) Gelatine (U.S.P.) with inferior grades of gelatine or with preflavored, sugar-laden dessert powders. Knox Gelatine contains absolutely no sugar or other substances to cause gas or fermentation. More than a score of bacteriological and chemical tests are used to maintain the purity, uniformity and strength of Knox Plain (Sparkling) Gelatine. Your hospital will procure Knox for your patients if you specify it by name.

KNOX GELATINE (U. S. P.)	FACTORY-FLAVORED GELATINE DESSERTS
All gelatine.	Only contain 10% to 12% gelatine.
Protein 85% to 87%.	Protein 10% to 12%.
pH about 6.0.	pH highly variable.
Absolutely no sugar.	85% sugar average.
No flavoring. No coloring. Odorless. Tasteless. Blends well with practically any food, including milk.	Contain flavoring, acid and coloring matter.
Practical for many diets including: diabetic, reducing, peptic ulcer, convalescent, anorexic, tubercular, colitic, aged, etc.	Contraindicated in diabetic, peptic ulcer and other diets.

KNOX GELATINE
(U. S. P.)
is plain, unflavored gelatine
All protein—no sugar

Send This Coupon for Free Booklets

KNOX GELATINE
Johnstown, N. Y., Dept. 408

Please send me ( ) copies of "Feeding Diabetic Patients—Young and Old." I understand there is no obligation.

NAME _____

ADDRESS _____

Continued from Page 42

Eye, Ear, Nose and Throat Hospital, New Orleans, recently elected as members of the Executive Committee Dr. W. A. Wagner, Dr. H. F. Brewster and Dr. John T. Crebbin.

Hotel Dieu, New Orleans, has elected Dr. H. Theodore Simon, President; Dr. George Taquino, Vice-President; Dr. John G. Menville, Secretary; and Dr. Lucy Scott Hill, Dr. O. C. Cassegrain, Dr. Frank Chetta, Dr. L. A. Fortier, Dr. Carlo J. Tripoli, Dr. Sidney L. Charbonnet, Jr., and Dr. Daniel J. Murphy, additional members to the Board.

Dr. H. J. Schattenberg, New Orleans, was recently elected to fellowship in the American College of Physicians.

Dr. Jules Myron Davidson has been reelected District Deputy Grand Consul of Phi Delta Epsilon Fraternity.

New Orleans Society for Neurology and Psychiatry has elected Dr. Walter J. Otis, President; Dr. C. P. May, Secretary-Treasurer; and Dr. H. R. Unsworth, Dr. T. A. Watters, and Dr. G. F. Roeling, members of Executive Committee.

French Hospital Staff, New Orleans, has elected Dr. Joseph Ciolino, Chairman; Dr. Vincent D'Ingianni, Vice-Chairman; and Dr. Lucien Delery, Secretary-Treasurer.

Dr. Hiram W. Kostmayer, Professor of Clinical Gynecology and Director of the Department of Graduate Medicine, Tulane University of Louisiana School of Medicine, New Orleans, has been appointed Acting Dean of the Medical School during the absence of Dr. Maxwell E. Lapham who has been assigned to special duty in the Bureau of Medicine and Surgery, U. S. Navy, having left for Washington in February.

Dr. William H. Gillentine, New Orleans, has recently been certified by the American Board of Internal Medicine and elected a member of the American College of Physicians.

Deaths

Dr. William Laughlin Grace, Plaquemine, aged 74, died recently of carcinoma of the lung.

Dr. Herbert Lee Garland, Logansport, aged 61, died recently of heart disease.

Dr. Hugh De Valin, New Orleans, aged 69, died February 3 of pneumonia.

MARYLAND

Medical and Chirurgical Faculty of Maryland will meet in Baltimore, April 28-30.

Allegany-Garrett County Medical Society has elected Dr. Knight Reynolds, President; Dr. E. L. Jones, Vice-President; Dr. Frank U. Davis, Secretary; and Dr. Clay Durrett, Treasurer, all of Cumberland.

Prince George's County Medical Society has elected Dr. James G. Sasscer, Upper Marlboro, President; Dr. Aaron A. Deitz, Hyattsville, Vice-President; and Dr. W. B. Moyers, Mount Rainer, Secretary-Treasurer.

Dr. John Collinson, Jr., since 1935 Assistant Chief Statistician for Vital Statistics, U. S. Bureau of the Census, has resigned to become Deputy State Health Officer of Maryland. Dr. Collinson had been associated with the Maryland State Department of Health for nineteen years before joining the Bureau of the Census.

Dr. Clifford E. Waller, Silver Springs, Medical Director, U. S. Public Health Service, has been named Health Officer in Loudoun County.

Deaths

Dr. Edward Lingan Bowlus, Baltimore, aged 69, died recently of arteriosclerosis.

Dr. Felix Reville Brunot, Bethesda, aged 47, died recently.

Dr. Michael A. Dailey, Baltimore, aged 59, died recently of injuries received in an automobile accident.

Dr. Harris Chaim Flinder, Baltimore, aged 75, died recently of heart block.

Continued on Page 46

THE JEFFERSON MEDICAL COLLEGE of PHILADELPHIA

FOUNDED 1825. A chartered university since 1838. Graduates 16,814.

FACILITIES: Modern, well-equipped laboratories; Curtis Clinic; Daniel Baugh Institute of Anatomy; Department for Diseases of the Chest; Jefferson Hospital; teaching museums and free libraries; instruction privileges in three other hospitals.

ADMISSION: A college degree based on four years of college work, including certain specified science and language courses, is required.

For full particulars write to the Office of the Dean, 1025 Walnut Street, Philadelphia, Pa.

WILLIAM HARVEY PERKINS, M.D., DEAN

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LaMOTTE FALLING DROP DENSIOMETER

(Two Models)

An important adjunct in treating cases of shock.

For determining blood proteins, albumin - globulin ratio and specific gravity of body fluids. These units are produced exclusively with the cooperation of H. G. Barbour and W. F. Hamilton, and approved by them.

This outfit is now available in two models—the larger model comes complete for $65 and the small model at $35. Prices F.O.B. Towson, Md.

Send for complete information.

This service includes a series of similar outfits for conducting the following accurate tests: Blood Sugar, Blood Urea, Sulfathiazole, Sulfapyridine, Sulfanilamide, Sulfadiazine and Sulfaguanidine in Blood and Urine, Icterus Index, Phenolsulphonthalein, Urine pH, Blood pH, Gastric Acidity, Calcium-Phosphorus, Blood Bromides, Urinalysis.

LaMOTTE CHEMICAL PRODUCTS CO., Dept. S, Towson, Baltimore, Maryland

The diagnostic value of any radiograph is, in the final analysis, dependent upon the specialized knowledge of the one who makes the interpretation. This is the reason why you should refer your patients to a competent radiologist.

Simple tumors of bone present characteristic radiographic appearances which permit of their identification by the experienced observer.

Malignant tumors of bone in the early stages present variable but characteristic radiographic features.

The recognition of one of these typical appearances should be followed by an x-ray examination of the lungs and pelvis for demonstration of possible metastases. The possibility that the bone lesion may be a metastasis from a primary carcinoma elsewhere should be considered.

No treatment should be administered until a complete radiographic record has been made.—RADIOLOGY, *33:* 494-5, 1939.

****The roentgen ray brought with it that same precision in the diagnosis and treatment of fractures that it contributed in the case of disease in bone or joint.*—J. BONE & JOINT SURG., *19:* 290, 1937.

EASTMAN KODAK COMPANY

Rochester, N. Y.

World's largest manufacturer of radiographic and photographic materials

Continued from Page 44

Dr. Stewart Paton, Baltimore, aged 76, died recently of heart disease.

Dr. Isaac Newton Simpers, Gaithersburg, aged 73, died recently of heart disease and nephritis.

MISSISSIPPI

A one-story health center building will be erected in Hattiesburg at an estimated cost of $22,000, this being a Defense Public Works project. The building will house the Forrest County Health Department.

Deaths

Dr. Robert Augustus Holcomb, Hickory Flat, aged 64, died recently of pulmonary tuberculosis.

MISSOURI

Dr. Ira H. Lockwood, Kansas City, has been appointed a member of the State Board of Health, succeeding Dr. Howard B. Goodrich, Hannibal.

Deaths

Dr. Charles S. Austin, Carrollton, aged 79, died recently of carcinoma of the liver.

Dr. Harry Benjamin Davis, Kansas City, aged 58, died recently of heart disease.

Dr. Phonrose Lewis Gardner, Kansas City, aged 61, died recently.

Dr. Charles C. Hankins, Springfield, aged 81, died recently of arteriosclerosis.

Dr. William R. Gaddie, Duenweg, aged 71, died recently.

Dr. Julius John Jeude, St. Louis, aged 65, died recently of pyloric obstruction due to gastric ulcer.

Dr. Thomas Adolphus Michie, Steele, aged 71, died recently of coronary thrombosis.

Dr. Henry John Niebruegge, St. Louis, aged 68, died recently.

Dr. Max C. Starkloff, St. Louis, aged 84, died recently.

Dr. Isadore Julius Wolf, Kansas City, aged 77, died recently of cerebral hemorrhage.

NORTH CAROLINA

Medical Society of the State of North Carolina will hold its next annual meeting in Charlotte, at the Hotel Charlotte, May 11-13.

Haywood County Medical Society has elected Dr. C. N. Sisk, Waynesville, President; Dr. C. R. Owen, Jr., Canton, Vice-President; and Dr. J. Frank Pate, Canton, Secretary.

Thermal Belt Medical Society has elected Dr. R. H. Crawford, Rutherfordton, President; and Dr. H. C. Thompson, Shelby, Secretary-Treasurer, reelected.

Mecklenburg County Medical Society has elected Dr. E. J. Wannamaker, President; Dr. L. C. Todd, First Vice-President; Dr. J. C. Montgomery, Second Vice-President; and Dr. R. Z. Query, Secretary-Treasurer. Dr. H. Stokes Munroe, Jr., is Editor of the Bulletin; Dr. Walter B. Mayer and Dr. Allan Tuggle, Associate Editors, and Dr. W. R. Pitts, Business Manager, all of Charlotte.

Davidson Hospital, Lexington, has elected Dr. W. B. Hunt, Chief of Staff; Dr. J. R. Terry, Staff Secretary; and Dr. J. C. Leonard, Dr. Milton Black and Dr. Jean Craven on the Executive Board.

Dr. L. R. Shaw, Statesville, has been elected Secretary-Treasurer of the Iredell-Alexander County Medical Society to fill the unexpired term of Dr. J. S. Holbrook, who has been called to duty in the Medical Corps of the U. S. Army.

Dr. P. P. Holt, Erwin, was recently paid tribute by prominent doctors of eastern North Carolina at a meeting of the Harnett County Medical Society. Dr. Holt is Chief of Staff at Good Hope Hospital and Harnett County's oldest practicing physician.

Dr. Robert T. Ferguson, Charlotte, has been chosen Coordinator for the Medical Care for the Civilian Defense Council in Charlotte and Mecklenburg County.

Dr. McChord Williams announces opening of offices in the Professional Building, Charlotte, for practice in general surgery.

Continued on Page 48

In the **Correction** *of*

Atonic Constipation

The therapeutic aim in atonic constipation is readily achieved with Cholmodin. Containing deoxycholic acid and extract of aloes, it raises the tonicity of the bowel wall, increasing contractility and peristaltic activity. Thus Cholmodin, unlike most measures employed in the treatment of constipation, acts in a physiologic manner, and upon both the upper and the lower bowel. It usually results in soft, formed stools, without excessive purgation or discomfort. Cholmodin finds its greatest field of usefulness in the constipation of the aged, of pregnancy, and in patients of sedentary occupation.

Prescribe original boxes of 50 tablets. Dosage, 2 tablets two or three times daily.

Riedel-de Haen, Inc.
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Cholmodin
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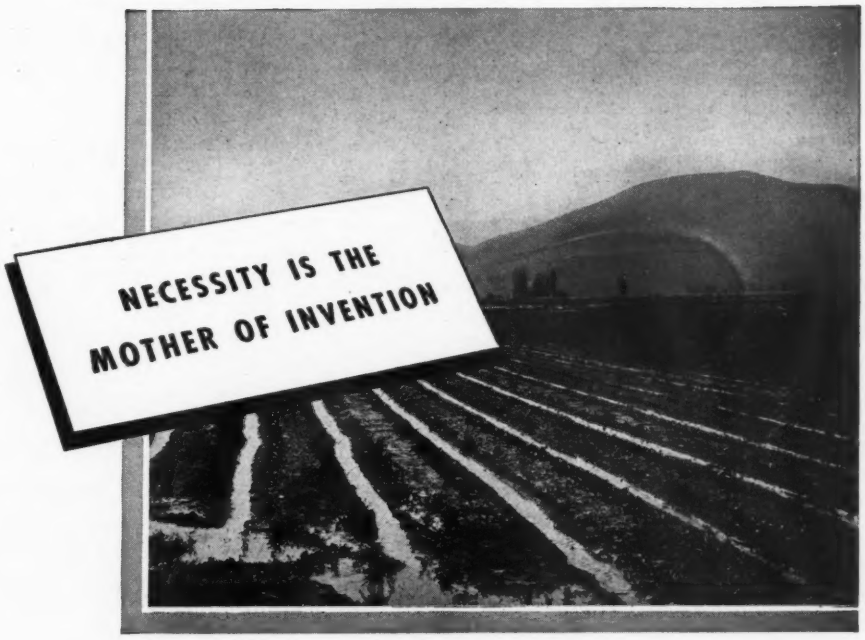

IN FARMING AREAS deprived of natural water supplies, as in the Southwest, the normal requirement of plants is provided by water from other sources—irrigation systems are created for just this purpose. In men deprived of the male sex hormone due to failing testicular function, as in the male climacteric, freedom, to a considerable extent, from the irritating climacteric symptoms—nervousness, irritability, lassitude, diminishing virility—may be provided if the hormone requirements are supplied in the form of *Neo-Hombreol,* the 'Roche-Organon' male sex hormone preparation.

In mild cases, 5 to 10 mg of Neo-Hombreol (testosterone propionate 'Roche-Organon') by intramuscular injection 2 or 3 times a week, and in severe cases, 10 to 25 mg Neo-Hombreol every second day affords satisfactory control of the symptoms. Maintenance therapy should be continued for from 3 to 12 months: 5 to 10 mg of Neo-Hombreol by intramuscular injection 2 to 3 times a week, 2 Neo-Hombreol (M) Dosules (methyl testosterone 'Roche-Organon') daily by cutaneous application or 2 to 5 oral Neo-Hombreol (M) tablets daily, suffice in most cases.

Packages: *For Parenteral Therapy*—Neo-Hombreol Ampuls, 1 cc, 5, 10, and 25 mg strengths, boxes of 3, 6, and 50. *For Oral Therapy*—Neo-Hombreol (M) Tablets, 10 mg, boxes of 15, 30, and 100. *For Cutaneous Therapy*—Neo-Hombreol (M) Dosules, 4 mg, boxes of 25.

• *Write for literature describing the uses of Neo-Hombreol in disorders of both the male and female.*

ROCHE-ORGANON, INC., NUTLEY, N. J.
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NEO-HOMBREOL
'Roche-Organon'

Continued from Page 46

Dr. Edward S. Grady, Winston-Salem, formerly Assistant Health Officer of the unit covering Forsyth, Stokes, Yadkin and Davie Counties, has been placed in charge of the Health Unit in Johnston County, succeeding Dr. Will H. Lassiter, Jr., Smithfield, resigned.

Dr. Charles H. Pugh, Gastonia, has been presented with a special scroll by Chapter 66, Royal Arch Masons, in recognition of his many services in the Order.

Dr. R. W. Graves, Assistant Professor of Neurology, Duke University School of Medicine, Durham, has been appointed as one of the Army Consultants on Meningitis.

Dr. J. M. Ruffin, Associate Professor of Medicine, Duke University School of Medicine, Durham, has been appointed as one of the Army Consultants on Tropical Disease.

Dr. James Franklin Reinhardt, Lincolnton, and Miss Jane Washburn, Shelby, were married recently.

Dr. Andrew P. Newcomb, Henderson, and Miss Felcie Clara Mize, Raeford, were married recently.

Dr. George Francis Busby, Salisbury, and Miss Dorothy Rudy, St. Petersburg, Florida, were married recently.

Dr. Samuel E. Elmore, Jr., Spindale, and Miss May Carroll Miles were married recently.

Dr. John Rufus McCracken and Miss Alma Estelle Kee, both of Waynesville, were married recently.

Dr. Thomas H. Byrnes, Charlotte, has been called to active duty at the Naval Hospital at Charleston, South Carolina. Dr. Byrnes organized a hospital unit last June and was commissioned as a Lieutenant Commander.

Dr. Dudley Smith, Waynesville, who has been serving for more than a year with the Harvard Medical Unit in England, has returned home.

Deaths

Dr. Ralph L. Daniels, New Bern, aged 54, died February 21.

Dr. C. Curtis Hudson, Greensboro, aged 60, died February 17 following a heart attack.

Dr. Carl White Jones, High Point, aged 29, died recently of pulmonary embolus complicating staphylococcic bronchia pneumonia.

Dr. William Pinckney Knight, Greensboro, aged 70, died February 2.

Dr. Frederick James Pate, Greensboro, aged 56, died recently of carcinomatosis.

Dr. Robert M. West, Salisbury, aged 72, died recently.

OKLAHOMA

Oklahoma State Medical Association will hold its next annual meeting in Tulsa, at the Mayo Hotel, April 22-24.

Beckham County Medical Society has reelected Dr. H. K. Speed, Sayre, President, and Dr. E. S. Kilpatrick, Elk City, Secretary.

Cleveland County Medical Society has elected Dr. F. C. Buffington, President; Dr. M. P. Prosser, Vice-President, and Dr. Phil Haddock, Secretary, all of Norman.

Logan County Medical Society has elected Dr. William C. Miller, Guthrie, President; Dr. C. L. Rogers, Marshall, Vice-President, and Dr. J. L. LeHew, Jr., Guthrie, Secretary.

Oklahoma State Medical Association's program of graduate lectures on Internal Medicine, with the financial assistance of the Commonwealth Fund of New York, will be continued under the instructorship of Dr. L. W. Hunt, Assistant Professor of Medicine, University of Chicago. Dr. Henry H. Turner, Oklahoma City, is the Committee Chairman. Those wishing specific information should address the Postgraduate Committee, 210 Plaza Court, Oklahoma City.

Dr. William L. Taylor, Holdenville, has been elected to serve as President of the Hughes County Medical Society for the seventh consecutive time.

Dr. O. E. Templin, Alva, who was recently reelected Secretary of the Woods County Medical Society, is beginning his twenty-second consecutive term as Secretary of his county society.

Dr. Richard M. Burke, Superintendent of Western Oklahoma Tuberculosis Sanatorium, Clinton, has been elected a Fellow in the American College of Physicians.

Dr. John M. Parrish, Jr., recently a Resident in Obstetrics and Gynecology at the University of Oklahoma Hospital, has been

Continued on Page 50

SEDATIVE ANTISPASMODIC

BELLADENAL

BELLAFOLINE a sedative of vagus functions gr. 1/250
(l-rotatory belladonna alkaloids)

PHENOBARBITAL a central sedative gr. 3/4

SUPPLIED: Tablets—tubes of 20, bottles of 100 and 500.

Scored tablets facilitate fractioning of dosage.

Literature and samples on request

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Mercurochrome is economical because stock solutions may be dispensed quickly and at low cost by the physician or in the dispensary. Stock solutions keep indefinitely.

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HW&D

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Baltimore, Maryland

Continued from Page 48

appointed to the Obstetrical Service of the Outpatient Department of the Hospital. Dr. Parrish has entered the practice of medicine in Oklahoma City with Dr. Tom Lowry with offices in the Osler Building.

Dr. J. William Finch, Hobart, has been appointed to the faculty of the University of Oklahoma School of Medicine as a Visiting Lecturer of Medicine.

Deaths

Dr. J. L. Adams, Hobart, aged 64, died recently of a heart attack.

Dr. J. W. Browning, Geary, aged 73, died January 9.

Dr. C. S. Bobo, Norman, aged 86, died February 3.

Dr. Joseph Bedford Hix, Altus, aged 63, died recently.

Dr. Augustus Monroe Jones, Enid, aged 86, died recently of arteriosclerosis.

Dr. Marion Grant Wyatt, Bartlesville, aged 77, died recently of pneumonia.

Dr. I. B. Oldham, Muskogee, aged 70, died January 14.

Dr. Okey Nelson Windle, Sayre, aged 60, died January 2 of coronary occlusion.

SOUTH CAROLINA

Tri-State Medical Association of the Carolinas and Virginia at its annual meeting held in Greenville in February elected Dr. George R. Wilkinson, Greenville, President; Dr. Frank S. Johns, Richmond, Virginia, President-Elect; Dr. Walter B. Martin, Norfolk, Virginia, Dr. K. B. Pace, Greenville, North Carolina, and Dr. C. W. Evatt, Charleston, Vice-Presidents; and Dr. J. M. Northington, Charlotte, North Carolina, Secretary-Treasurer, reelected. The 1943 meeting will be held in Lynchburg, Virginia.

Tri-County Hospital, Orangeburg, has appointed Dr. Homer M. Eargle, Chief of Staff; and Dr. Augusta A. Willis, Secretary, re-elected. The Executive Committee is composed of Dr. C. A. Mobley, Dr. G. C. Bolin and Dr. G. M. Truluck.

Medical Historical Club, Columbia, has elected Dr. William Weston, Jr., President; Dr. I. K. Mikell, Vice-President, and Dr. W. A. Hart, Secretary-Treasurer.

Columbia Hospital recently elected to its staff Dr. L. Emmett Madden, Chief; Dr. William Weston, Jr., Vice-Chief, and Dr. Lewis Pitts, Secretary. Dr. R. B. Durham and Dr. R. G. Doughty were appointed liaison officers between the staff and the superintendent.

Dr. R. B. Durham, Columbia, has been made Medical Director for the Capital Life and Health Insurance Company.

The Naval Hospital unit, organized from among the Charlotte doctors, has been called to active service. It is headed by Lieutenant Commander Thomas H. Byrnes, who graduated from the Medical College of the State of South Carolina, Charleston, and for several years was Assistant Professor of Pathology at the College.

St. Francis Xavier Infirmary, Charleston, will have a fourth story added, making seventy beds available at the hospital. A federal grant of $70,000 will defray part of the expenses.

Dr. John W. Corbett, Camden, has been chosen the first honorary member of the South Carolina Tuberculosis Association.

Dr. John H. Mathias, Lexington, has been appointed Chief of Emergency Medical Service for Lexington County.

Dr. Paul Pennington Hearn, Greenville, and Miss Ida Irene Kemp, Atlanta, Georgia, were married recently.

Dr. Gilbert Collings, Clemson, and Miss Margaret Pitts, Baltimore, Maryland, were married February 28.

Dr. Marion Burnside Hook, Columbia, and Miss Peggy Elizabeth Lollis, Baltimore, Maryland, were married February 28.

Deaths

Dr. John Blassingame Johnston, St. George, aged 62, died recently.

Dr. Lawrence Beaucham Owens, Columbia, aged 74, died recently of coronary thrombosis following pneumonia.

Continued on Page 52

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ROAD TO RECOVERY

Weakened by the effects of debilitating disease or surgery, the convalescent patient needs a high calorie diet well in excess of normal requirements.

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is particularly adapted to this type of patient because it combines well-balanced nutrition in an appetite appealing, easily digested, liquid form.

Horlick's Fortified, prepared by a special process from full cream milk and staple cereals, is partially predigested, has a curd tension approaching zero and presents the following desirable nutritive factors:

Protein—including the biologically complete protein of milk.

Carbohydrates—in soluble form, as Dextrin, Maltose and Lactose.

Fat—in easily digestible form of milk fat.

Minerals—with milk, rich in calcium and phosphorus.

Vitamins—a recognized adult daily minimum requirement of A, B_1, D, G.

Recommend

HORLICK'S

The *Complete* Malted Milk—Not Just a Malt Flavoring for Milk.

HORLICK'S

Continued from Page 50

TENNESSEE

Tennessee State Medical Association will hold its next annual meeting at Memphis, April 14-16.

Dr. James E. Shull, Erwin, and Miss Margaret Tucker, Kingsport, were married recently.

Dr. Augustus McCravey, Chattanooga, and Miss Helen M. Welles, Cunnington, Massachusetts, were married recently.

DEATHS

Dr. Edgar H. Ford, Knoxville, aged 62, died recently of cerebral hemorrhage.

Dr. James A. Price, Oakville, aged 55, died January 10.

Dr. J. H. Williams, McKenzie, aged 60, died February 1.

Dr. Joe B. Wright, Lynnville, aged 53, died February 3.

TEXAS

Angelina County Medical Society has elected Dr. M. A. Estep, Lufkin, President; Dr. C. B. Stewart, Huntington, Vice-President, and Dr. Mitchell O. Gibson, Lufkin, Secretary-Treasurer.

Bexar County Medical Society has elected Dr. Conn L. Milburn, President; Dr. T. E. Christian, Vice-President; Dr. Ervin F. Lyon, Secretary, and Dr. W. H. Heck, Treasurer, all of San Antonio.

Cameron-Willacy Counties Medical Society has elected Dr. George Gallaher, Harlingen, President; Dr. George Bennack, Raymondville, Vice-President; and Dr. Phil Bleakney, Harlingen, Secretary.

Dallas County Medical Society has elected Dr. John L. Goforth, President; Dr. Marvin D. Bell, Vice-President; and Dr. W. W. Fowler, Secretary-Treasurer, all of Dallas.

Dewitt County Medical Society has elected Dr. Corine Westphal, Yorktown, President; Dr. B. S. Richter, Yoakum, Vice-President; and Dr. G. A. King, Cuero, Secretary.

El Paso County Medical Society has elected Dr. W. E. Vandevere, President-Elect; Dr. J. E. Morrison, Vice-President; and Dr. C. F. Rennick, Secretary-Treasurer, all of El Paso.

Galveston County Medical Society has elected Dr. V. W. N. Eggers, President; Dr. T. G. Blocker, Jr., Vice-President; and Dr. W. L. Marr, Secretary, all of Galveston.

Gaudalupe County Medical Society has elected Dr. R. L. Knolle, President; Dr. Allen I. Heinen, Vice-President; and Dr. Jesse B. Williams, Secretary, all of Seguin.

Gonzales County Medical Society has elected Dr. N. A. Elder, Nixon, President, reelected; Dr. A. B. Parr, Gonzales, Vice-President; and Dr. George W. Wilhite, Gonzales, Secretary-Treasurer, reelected.

Gray-Wheeler Counties Medical Society has elected Dr. G. N. Walker, Wheeler, President; and Dr. Frank W. Kelley, Pampa, Secretary.

Hill County Medical Society has elected Dr. Livingston Barnes, Hubbard, President; Dr. D. R. Foster, Itasca, Vice-President; and Dr. J. E. Boyd, Hillsboro, Secretary-Treasurer, reelected, an office which he has held for twenty years.

Hunt-Rockwell Rains Counties Medical Society has elected Dr. W. M. Dickens, Greenville, President; Dr. J. Russell Smith, Wolfe City, Vice-President; and Dr. W. P. Philips, Greenville, Secretary-Treasurer.

Nueces County Medical Society has elected Dr. Burch Thompson, President; Dr. Maury J. Perkins, Vice-President; and C. J. Connor, Secretary-Treasurer, all of Corpus Christi.

Walker-Madison-Trinity Counties Medical Society has elected Dr. John Carr Garrett, Huntsville, President; Dr. C. M. Cole, Madisonville, Vice-President; and Dr. Robert Thomason, Huntsville, Secretary-Treasurer.

Wichita County Medical Society has elected Dr. O. W. Wilson, President; Dr. C. A. Wilcox, First Vice-President; and Dr. Richard L. Nelson, Secretary-Treasurer, all of Wichita Falls.

Wilbarger County Medical Society has elected Dr. A. C. Rogers, Vernon, President; Dr. J. J. Muirhead, Vernon, Vice-President; and Dr. Joe Shipman, Dallas, Secretary-Treasurer.

Wood County Medical Society has elected Dr. W. T. Black, Quitman, President; Dr. Ross Matthews, Mineola, Vice-President; and Dr. V. E. Robbins, Quitman, Secretary-Treasurer.

Continued on Page 54

Now—Both Smith and Hodge Patterns *in the new Emmert Plastic Pessary*

The Emmert Plastic Pessary, first offered in the Smith pattern, proved so successful that we are now offering it in both Smith and Hodge patterns. Pessaries in this new material, suggested by Dr. Frederick V. Emmert of St. Louis, may be shaped before insertion to the requirements of the individual patient. Placing in the tray of a sterilizer or in hot water for a few minutes softens the material momentarily for shaping. Hardening after heating is a matter of seconds. The glass-smooth, transparent material will not affect membranes or cause increased secretion. It never becomes roughened in use; will not absorb odors, and is easily cleansed with cold water and soap.

Emmert-Smith Plastic Pessary:	Size	0	1	2	3	4	5
	Diam., ins.	2¾	3	3¼	3½	3¾	4¼
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	Diam., ins.	2½	2¾	3	3¼	3½	

PRICE—Either pattern, each **50c.** Per dozen **$5.00**
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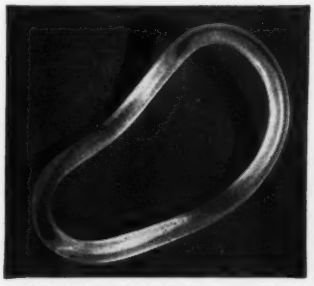

Emmert-Smith Plastic Pessary

Emmert-Hodge Plastic Pessary

A. S. ALOE COMPANY

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In addition to its prompt buffering effect, Amphojel inactivates pepsin, providing twofold protection for the ulcer. Besides promoting rapid healing of the lesion, recent investigations show the value of Amphojel in prolonging the duration of remission.

New illustrated 40-page booklet, "THE HEALING OF PEPTIC ULCER," with complete bibliography, sent free at your request.

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Continued from Page 52

St. Ann Hospital Staff, Abilene, has elected Dr. Jack Estes, Chairman; Dr. C. L. Prichard, Vice-Chairman; and Dr. J. P. Gibson, Secretary. Members of the Executive Committee for a two-year term are Dr. O. W. Little and Dr. Jack Crow.

Methodist Hospital Staff, Houston, has elected Dr. James A. Greenwood, Jr., President; Dr. Herbert L. Alexander, President-Elect; Dr. A. N. Boyd, Vice-President; and Dr. J. D. McCulley, Secretary.

Jefferson Davis Hospital Staff, Houston, has elected Dr. Fred A. Bloom, Vice Chief-of-Staff; Dr. Fred Smith, Chief of Surgical Division, reelected; Dr. Marshall Wallace, Chief of Medical Division; and Dr. H. N. Gemoetz, Secretary.

Mother Frances Hospital Staff, Tyler, has elected Dr. E. G. Faber, President; Dr. L. R. Rhine, Vice-President; Dr. Elbert Caldwell, Secretary; and Dr. Tom Jarman and Dr. E. D. Rice, Executive Members.

Christ the King Hospital Staff, Vernon, has elected Dr. B. W. Miller, President; Dr. Howard Reger, Vice-President; Lieutenant Jack Restivo, Secretary; Captain James Vanneter, Assistant Secretary; and Dr. T. A. King, Parliamentarian.

Bethania Hospital Staff, Wichita Falls, has elected Dr. J. A. Heymann, President; Dr. Robert Hargrave, Vice-President; Dr. C. H. Bishop, Secretary; and Dr. J. A. Little, Assistant Secretary.

Gonzales Warm Springs Foundation for Crippled Children, Gonzales, was recently organized and Dr. George Holmes, Gonzales, is Medical Director; Dr. Edward A. Cayo, San Antonio, Orthopedic Director; Dr. J. T. O'Banion, Luling, and Dr. L. L. Edwards, San Marcos, Associate Medical Directors; Dr. Walter Stuck, San Antonio, Associate Orthopedic Director; Dr. Walter Sievers, Gonzales, and Dr. M. P. Rochelle, Associate Medical Directors.

Continued on Page 56

Increasing Demand for Laboratory Technicians

The ever increasing demand for Gradwohl graduates is the best recommendation for the thoroughness of our course.

Recently we have added two additional months, making the course now one year. In addition, students must serve six months' internship before receiving diplomas. We have added a highly-trained biological chemist to our teaching staff.

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RATES for insertion in the Classified Column are as follows: $2.00 minimum, which includes the first 50 words; for each word in addition to the original 50 words, the charge is 3c.

FOR SALE—Victor electrocardiograph, Model A, 1929, in operating condition. Price $125.00. Write Box 395, Parrish, Alabama.

WANTED—One ear, nose, and throat treatment chair, one motor D.-compressor, one stool, one sterilizer, one x-ray stationary, one treatment unit, one short wave machine. Must be in good condition and cheap. Dr. Samuel T. Parker, 112½ North Market Street, Jackson, Tennessee.

WANTED—Two assistant residents at once, male or female, Council-approved Department of Anesthesiology. Supervised teaching in all phases of anesthesia. Must be graduate of class A medical school. Appointment for a minimum of two years, salary and full maintenance. Write Department of Anesthesiology, University Hospital, Augusta, Georgia.

POSITION WANTED—Laboratory and x-ray technician. Woman with sixteen years' experience in doctor's office and small hospitals desires position with future. Address inquiries to Dept. M-4, SOUTHERN MEDICAL JOURNAL, Birmingham, Alabama.

EDITING—Preparation of papers and reports, indexing, abstracting, bibliographies and similar services to physicians. Address inquiries to Elizabeth M. McFetridge, M.A., 4810 St. Charles Avenue, New Orleans, Louisiana.

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"—and to hasten your convalescence"

ENDOGLOBIN

with Vitamin B1

A useful and palatable reconstructive and hematinic tonic of proven value in asthenia, anorexia, "run down" conditions and particularly in the recuperative stages of serious infectious disease or major operative procedure. Excellent for children. Contains no sugar or alcohol.

ENDOGLOBIN is composed of beef blood, iron (as iron peptonate), liver concentrate, glycerophosphate and crystalline vitamin B1 (Thiamine Hydrochloride, 3 mgs. to the ounce).

SUPPLIED in 8 and 16 ounce bottles.

DOSAGE: Adults 1 Tablespoonful, Children 1 to 2 Teaspoonfuls. Before Meals.

Information on request

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Continued from Page 54

Dr. D. R. Scott and Dr. Roy G. Hallum are constructing a fifteen-room medical office building in Brownwood which will cost approximately $11,000.

Marshall Medical and Surgical Clinic Building, Marshall, which contains twelve rooms and costs $12,000, was recently opened.

Texas Academy of Science held its meeting recently in connection with the American Association for the Advancement of Science at Dallas and elected Dr. Elmer P. Cheatum, Associate Professor of Biology, Southern Methodist University, President; Dr. Frederick A. Burt, Texas A. and M. College, Executive Vice-President; Dr. Willis G. Hewatt, Fort Worth, Dr. T. H. Etheridge, Huntsville, Dr. L. W. Blau, Houston, and Dr. Gordon Gunter, Rockport, Vice-Presidents; Dr. Leo T. Murray, Secretary; Dr. George E. Potter, Assistant Secretary; Dr. Frank J. O'Hara, Editor; and Dr. W. Armstrong Price, San Antonio, Director.

Texas Ophthalmological and Otolaryngological Society at its recent meeting held at San Antonio elected Dr. C. P. Schenck. Fort Worth, President; Dr. F. H. Rosebrough, San Antonio, First Vice-President; Dr. August Streit, Amarillo, Second Vice-President; Dr. M. K. McCullough, Dallas, Secretary; and Dr. C. Charles Dickson, Houston, Treasurer.

Major Harry G. Armstrong, U. S. Army Medical Corps, in charge of research at the School of Aviation Medicine, Randolph Field, San Antonio, has been named to receive the John Jeffries Award given by the Institute of the Aeronautical Sciences for his contributions to the health and efficiency of military and civil aircraft pilots. The award is named after John Jeffries, a Boston physician, who was the first American to make scientific observations from the air. Dr. Armstrong graduated at the University of Louisville School of Medicine in 1925.

Dr. William C. Ghormley has been appointed City Health Officer and City Physician of Corpus Christi.

Dr. A. E. Walker, formerly of Ferris and Plamer, is now in England serving in the White Lodge Hospital at Newmarket, Suffolk, England, near London.

Dr. James Griffin Taylor, Jr., and Dr. Sarah Ferguson, both of Dallas, were married recently.

Dr. John F. Lubben, Jr., Dallas, and Miss Virginia Breeding, Houston, were married recently.

Deaths

Dr. Arthur N. Brown, Richland, aged 81, died recently of diabetes mellitus.

Dr. John G. Clay, Dallas, aged 83, died recently.

Dr. Robert B. Longmire, Hale Center, aged 80, died recently of cerebral hemorrhage.

Dr. Henry Reeves Link, Palestine, aged 76, died recently of bronchiectasis.

Dr. George Curtis Lyon, Longview, aged 63, died recently of coronary thrombosis.

Dr. Rodolfo Z. Pereya, El Paso, aged 49, died recently of myelitis.

Dr. William Richardson, Athens, aged 75, died recently of chronic nephritis and myocarditis.

Dr. L. E. Shoemaker, Hillsboro, aged 73, died recently of cerebral hemorrhage.

Dr. J. D. Thompson, Port Arthur, aged 62, died recently of cerebral hemorrhage and hypertension.

Dr. William White, El Paso, aged 77, died recently of a skull fracture received in a fall.

Dr. William Edward Wills, Corpus Christi, aged 67, died recently of cerebral hemorrhage.

Dr. W. H. Atkinson, Florence, aged 88, died recently.

Dr. William Roland Butler, Crystal City, aged 75, died of hemiplegia, uremia and carbuncle.

VIRGINIA

Tri-State Medical Association of the Carolinas and Virginia at its annual meeting held in Greenville, South Carolina, February 23-24, elected Dr. George R. Wilkinson, Greenville, South Carolina, President; Dr. Frank S. Johns, Richmond, President-Elect; Dr. Walter B. Martin, Norfolk, Dr. K. B. Pace, Greenville, North Carolina, and Dr. C. W. Evatt, Charleston, South Carolina, Vice-Presidents; and Dr. J. M. Northington, Charlotte, North Carolina, Secretary-Treasurer, reelected. The 1943 meeting will be held at Lynchburg.

James River Medical Society has elected Dr. E. B. Nuckols, Cumberland, President; Dr. Percy Harris, Scottsville, Vice-Presi-

Continued on Page 58

OINTMENT SPECIALISTS SINCE 1900

Having pioneered ophthalmic ointments in this country, "MESCO" today offers the profession virtually every standard formula for ophthalmology. Again "MESCO" offers the profession two of the most talked of products for ophthalmic use.

SULFANILAMIDE OINTMENT 5% List No. 64

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Since their introduction to the profession in ointment form for ophthalmic use, these two products have gained steadily in general acceptance and popularity. We invite you to try these products where indicated. Also in the event you do not have our catalog, a card will bring one to you by return mail.

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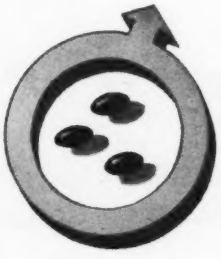
FOR BLOOD DONORS

...The hemoglobin regeneration rate increases nearly 50% and the recovery period is drastically shortened when small amounts of iron are administered.†

℞ HEMATINIC PLASTULES*

Hematinic Plastules provide iron in the *ferrous* state quickly available for conversion into hemoglobin. They are easy to take and well tolerated. Each Plastule contains dried ferrous sulphate U.S.P.X. 5 gr. and yeast concentrate .75 gr., supplied in bottles of 50, 100 and special hospital size of 1,000. Also available with Liver Extract.

Ferrous Iron Sealed from the Air but not from the Patient



†Fowler and Barer: "Rate of Hemoglobin Regeneration in Blood Donors." J.A.M.A., 118:421:1942.

*Reg. U. S. Pat. Off.

THE BOVININE COMPANY • CHICAGO, ILLINOIS

Continued from Page 56

dent; and Dr. Garland Dyches, Dillwyn, Secretary-Treasurer, reelected.

Neuropsychiatric Society of Virginia has elected Dr. Howard R. Masters, Richmond, President; Dr. Edward H. Williams, Richmond, Vice-President; and Dr. Joseph R. Blalock, Marion. Secretary-Treasurer.

The Physicians' Hospital, Incorporated, Warrenton, an institution organized through the efforts of the doctors of Fauquier and surrounding counties, opened recently fully equipped for the care of medical, surgical and obstetrical patients. Officers for this year are Dr. Richard Mason, The Plains, President; Dr. Stewart McBryde, Manassas, Vice-President; Dr. J. E. Knight, Warrenton, Second Vice-President; Dr. George H. Davis, Warrenton, Third Vice-President; Dr. William R. Pretlow, Warrenton, Secretary-Treasurer; Dr. M. B. Hiden, Leesburg, Chairman of the Board of Directors; Dr. J. Frank Folk, Warrenton, Vice-Chairman of the Board of Directors; and Miss S. Lena Yates, Superintendent. All the officers are stockholders and also the following physicians: Dr. W. G. Trow, Warrenton, Dr. W. O. Bailey, Leesburg, Dr. H. L. Townsend, Marshall, Dr. Wade C. Payne, Haymarket and Dr. V. L. McCullers, Remington.

Dr. Walter L. Nalls, Richmond, and Dr. John Braxton McKee, Winchester, were elected to fellowship, and Dr. Robley Dunglison Bates, Jr., Dr. Morton Morris Pinckney and Dr. Elam Cooksey Toone, Jr., all of Richmond, were elected to associateship in the American College of Physicians at a recent meeting of the Board of Regents.

Dr. Charles W. Scott, previously clinician with the Tuberculosis Out-Patient Service of the State Health Department, has been appointed to have charge of the medical work of the Piedmont Sanatorium, Burkeville.

Dr. Edward J. Guilfoyle, Norfolk, has moved to Palmerton, Pennsylvania, where he is Junior Resident Surgeon at Palmerton Hospital.

Dr. and Mrs. James H. Ferguson, Clifton, recently observed their fiftieth wedding anniversary.

Dr. Benjamin Watkins Rawles, Jr., and Miss Helen Hodges James, both of Richmond, were married February 21.

Dr. Thomas Felix Coates and Miss Nancy Lewis Salter Shewmake, both of Richmond, were married January 31.

Deaths

Dr. Wilbur Henson Hale, Narrows, aged 39, died recently of pneumonia.

Dr. Henry P. Brown, Lynchburg, aged 58, died recently.

Dr. John Augustus Pollard, Lynchburg, aged 68, died recently.

Dr. William Johnston Strother, Culpepper, aged 92, died February 15.

WEST VIRGINIA

Greenbrier Valley Medical Society has elected Dr. H. D. Gunning, Ronceverte, President; Dr. K. J. Hamrick, Marlinton, Vice President; and Dr. A. G. Lanham, Ronceverte, Secretary-Treasurer.

McDowell County Medical Society has elected Dr. J. C. Hutchinson, President; Dr. James E. Vermillion, Vice-President; and Dr. A. J. Villani, Secretary, all of Welch.

Raleigh County Medical Society has elected Dr. R. G. Broaddus, Bowling Green, President; Dr. D. D. Daniel, Beckley, First Vice-President; Dr. J. H. Greene, Slab Fork, Second Vice-President; and Dr. H. A. Shaffer, Beckley, Secretary-Treasurer.

Dr. Robert King Buford, Charleston, has been named to serve as Chairman of the West Virginia State Medical Association's Preparedness Committee, succeeding the late Dr. R. H. Walker. Serving with Dr. Buford on the Committee are Dr. D. A. MacGregor, Wheeling; Dr. Frank V. Langfitt, Clarksburg; Dr. R. J. Wilkinson, Huntington; and Dr. Wade H. St. Clair, Bluefield.

Deaths

Dr. Eldridge H. Campbell, Alderson, aged 73, died recently of coronary thrombosis.

Dr. Michael Albert Dowler, Glen Dale, aged 89, died recently of chronic nephritis.

Dr. Oscar T. Hines, Huntington, aged 67, died recently of pneumonia and chronic myocarditis.

Dr. Rome H. Walker, Charleston, aged 53, died February 19.

Dr. James Thomas Ferrell, Spencer, aged 56, died February 9.

Dr. Greenberry P. Fisher, Tuppers Creek, aged 68, died February 9.

EFFECTIVE THERAPY
IN
Otitis Media
REQUIRES ANALGESIA - BACTERIOSTASIS, AND DEHYDRATION OF THE TISSUES.
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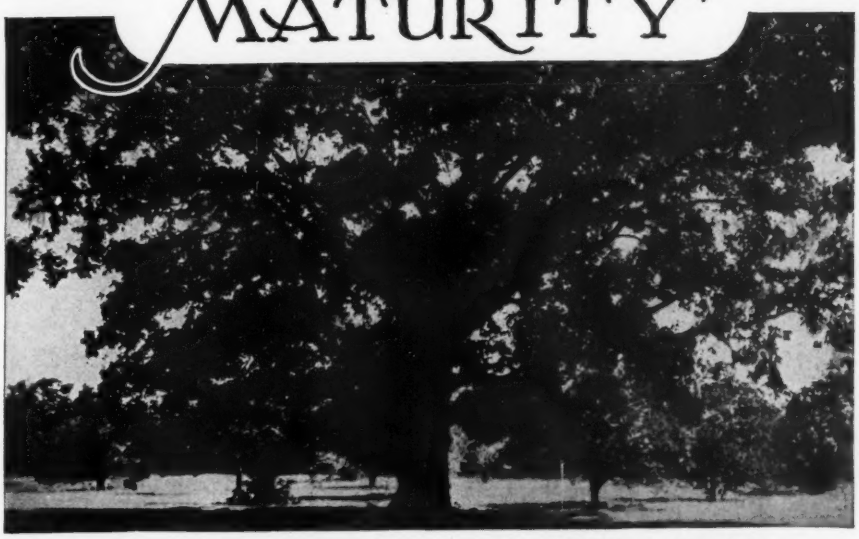
MATURITY



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URO PHOSPHATE

—for over 21 years a preferred urinary antiseptic

A tablet of methenamine and acid sodium phosphate manufactured and packaged by a process that prevents loss of potency.

Issued in hermetically sealed bottles of 100 tablets

DOSAGE

Two URO-PHOSPHATE Tablets in a glass of water three or four times a day until urine becomes clear. It is desirable to moderately limit fluid intake.

Each tablet of URO-PHOSPHATE contains

Methenamine . . . . . gr. 7½
Acid Sodium Phosphate . . . . . gr. 10

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RICHMOND VIRGINIA

BRIEF HISTORICAL NOTES ON MEAD'S CEREAL AND PABLUM

HAND in hand with pediatric progress, the introduction of Mead's Cereal in 1930 marked a new concept in the function of cereals in the child's dietary. For 150 years before that, since the days of "pap" and "panada," there had been no noteworthy improvement in the nutritive quality of cereals for infant feeding. Cereals were fed principally for their carbohydrate content.

The formula of Mead's Cereal was designed to supplement the baby's diet in minerals and vitamins, especially iron and B_1. How well it has succeeded in these functions may be seen from two examples:

(1) As little as one-sixth ounce of Mead's Cereal supplies over half of the iron and more than one-fifth of the vitamin B_1 minimum requirements of the 3-months-old bottle-fed baby. (2) One-half ounce of Mead's Cereal furnishes all of the iron and two-thirds of the vitamin B_1 minimum requirements of the 6-months-old breast-fed baby.

That the medical profession has recognized the importance of this contribution is indicated by the fact that cereal is now included in the baby's diet as early as the third or fourth month instead of at the sixth to twelfth month as was the custom only a decade or two ago.

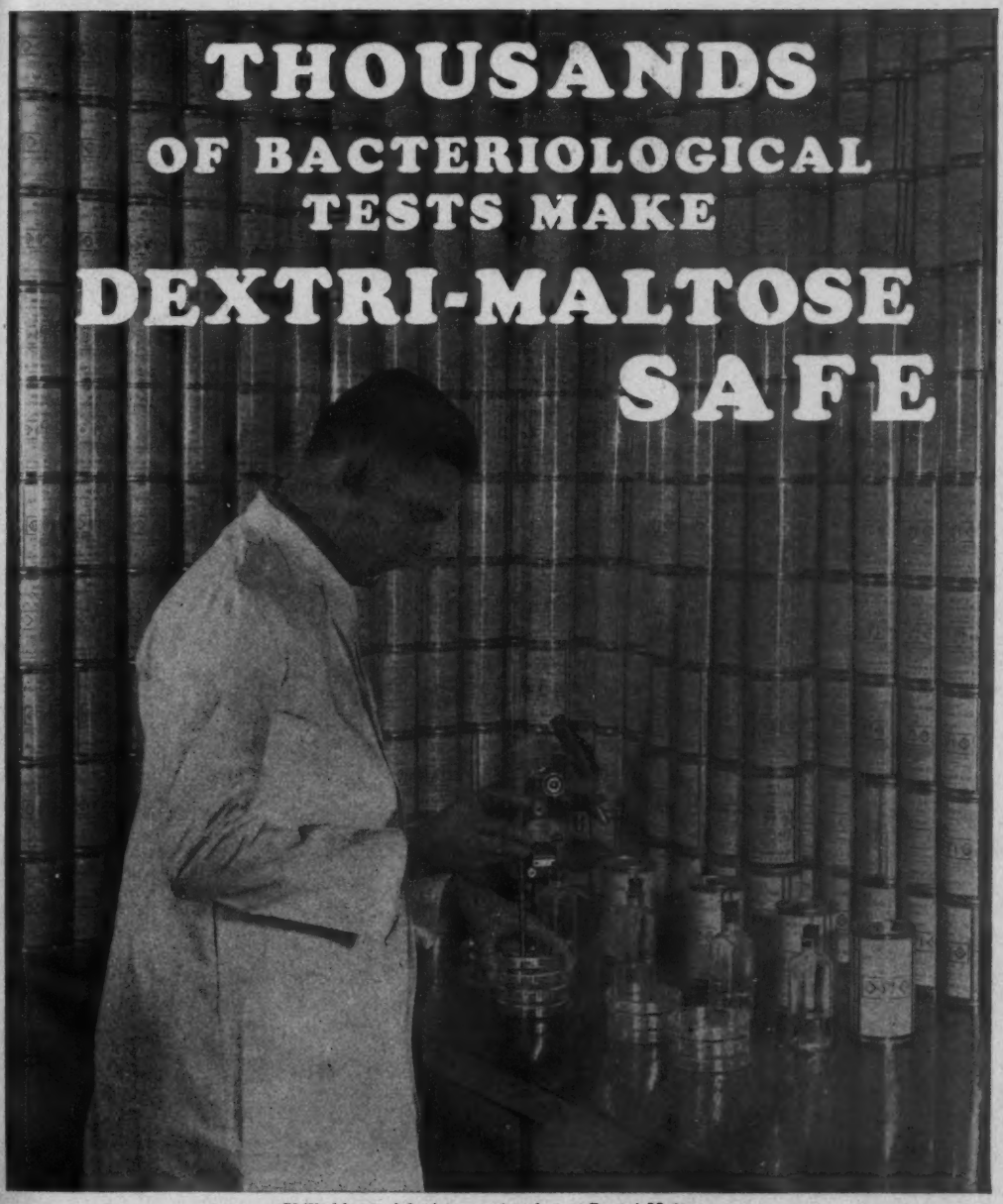
In 1933 Mead Johnson & Company went a step further, improving the Mead's Cereal mixture by a special process of cooking, which rendered it easily tolerated by the infant and at the same time did away with the need for prolonged cereal cooking in the home. The result is Pablum, an original product which offers all of the nutritional qualities of Mead's Cereal, plus the convenience of thorough scientific cooking.

During the last ten years, these products have been used in a great deal of clinical investigation on various aspects of nutrition, which have been reported in the scientific literature. •

Many physicians recognize the pioneer efforts on the part of Mead Johnson & Company by specifying Mead's Cereal and PABLUM.

Pablum is a palatable mixed cereal food, vitamin and mineral enriched, composed of wheatmeal (farina), oatmeal, cornmeal, wheat embryo, beef bone, brewers' yeast, alfalfa leaf, sodium chloride, and reduced iron.

THOUSANDS OF BACTERIOLOGICAL TESTS MAKE DEXTRI-MALTOSE SAFE



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